Mathematics 4

Module 8

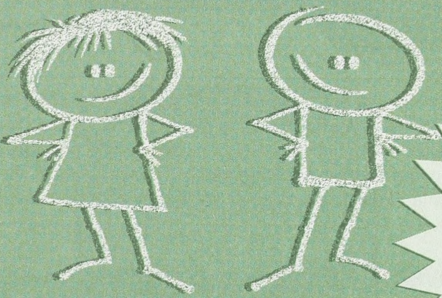
Exploring Geometry

Learning Technologies Branch

Alberta LEARNING

Mathematics 4

Module 8
Exploring Geometry



Note
A page providing information for the home instructor is included in this module.

Learning Technologies Branch

Alberta LEARNING

Mathematics 4
Module 8: Exploring Geometry
Student Module Booklet
Learning Technologies Branch
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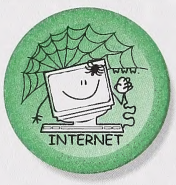
This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	✓
General Public	
Other	



The Learning Technologies Branch has an Internet site that you may find useful. The address is as follows:

http://www.learning.gov.ab.ca/ltb

The use of the Internet is optional. Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

Welcome!

Mathematics 4 contains nine modules. Work through the modules in the order given, since several concepts build on each other as you progress through the course.

Mathematics 4

Module 1
Data Management

Module 2
Number Concepts and Patterns

Module 3
Fractions and Decimals

Module 4
Addition and Subtraction

Module 5
Multiplication

Module 6
Division

Module 7
Measurement

Module 8
Exploring Geometry

Module 9
Investigating Outcomes

Icons

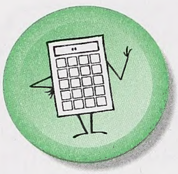
The book you are presently reading is called a Student Module Booklet. You will find icons used throughout it. Read the following explanations to find out what each icon tells you to do.

Pay close attention to important words or ideas.

Refer to the textbook *Quest 2000: Exploring Mathematics*.

Use manipulatives, cut-out learning aids, or pull-out pages.

Do an activity to review the concept.

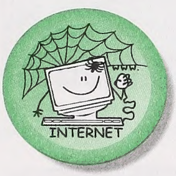


Use a calculator.

Prepare to do a Challenge activity.

Do an activity just for fun!

Do an activity with your home instructor.



Use the Internet.

Use the Answer Key to Self-Marking Activities in the Appendix to correct activities.

Information for the Home Instructor

Manipulatives

For Module 8: Exploring Geometry students will need some basic drawing tools: a pencil, an eraser, a centimetre ruler, crayons or coloured markers, and drawing paper. In addition, students will need a variety of other manipulatives for studying two- and three-dimensional figures.

Each concept is listed with the manipulatives required for that particular concept.

Two-Dimensional Figures

- scissors
- toothpicks
- plasticine or modelling clay
- different lengths of string or yarn

Angles

- drinking straws
- pipe cleaners
- tape
- paper strips
- brass fastener

Right Angles

- index card (or small pieces of heavy paper) with square corners

Polygons

Instructions are provided in the Appendix for constructing a geoboard. A geoboard is a recommended manipulative for completing this course and future mathematics courses. You may be able to purchase or borrow a geoboard from a local school or resource centre. If you are unable to construct or purchase a geoboard, dot pattern paper is provided in the Appendix.

The following materials are needed if you plan on making a geoboard:

- plywood
- nails
- elastic bands
- measuring tape

Congruence and Symmetry

- tracing paper, tissue paper, or transparent plastic sheets (transparency sheets)

Three-Dimensional Figures

- a collection of empty household containers of various shapes and sizes
  - cereal box
  - milk carton
  - small gift boxes
  - Toblerone chocolate box

- scissors

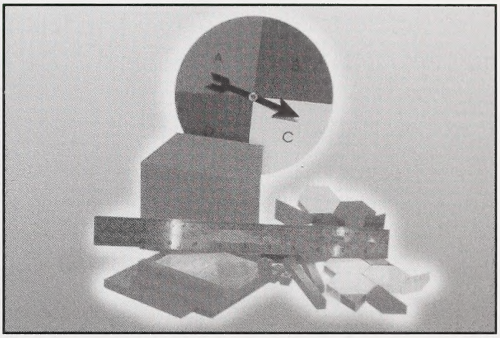
- tape

Grids and Maps

- a selection of maps (if possible)
  - provincial road maps
  - local map
  - atlas

The Grade 4 Mathematics course is designed to keep you actively involved in learning as you progress through the daily lessons in each of the nine modules. Besides the Student Module Booklets, you will also need a copy of the Grade 4 Mathematics textbook called *Quest 2000: Exploring Mathematics.* The textbook contains pictures, information, questions, and problems that are referred to in the modules. Each module also requires you to complete one or more Assignment Booklets to be sent to your teacher for marking.

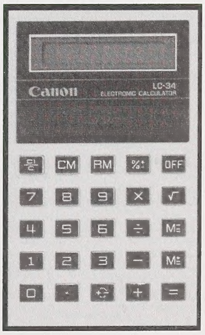
Manipulatives



Manipulatives are hands-on materials that you will be using to help you learn new concepts and ideas. They include things like base ten blocks, geoboards, spinners, counters, polygon shapes, tiles, rulers, and metre-sticks. Don't worry if you don't have all of these manipulatives. Some can be found in the Cut-Out Learning Aids section of the Appendix in several of the modules. Some you may be asked to make from materials found in your own home. However, it is highly recommended that you have a set of base ten blocks. They will be used often to help you to understand many new math concepts.

You should use manipulatives whenever you think they will help you understand something new you are learning. Manipulatives can also be useful when you are sharing or discussing what you know with your home instructor.

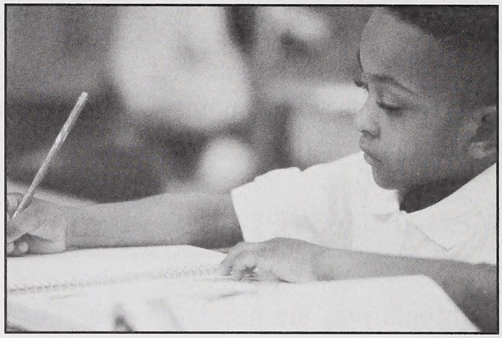
Calculators



You will need a calculator for many of the activities in Mathematics 4. It is important to remember that a calculator is a tool to be used when doing difficult calculations and when investigating what numbers can do. Don't rely on the calculator for calculations that you can do in your head. For example, you would not use a calculator when estimating or doing mental math. Both of these activities rely upon mastering the basic number facts.

Basic Number Facts

You will practise the basic facts on several days of each module. Each drill is timed to encourage you to work quickly. At first, you may not do very well because you may not know all of the number facts yet, or you may have forgotten some of the number facts you learned last year. Don't worry. By practising the facts regularly, your scores will improve over time. Strategies to help you learn the number facts will be presented in the lessons.

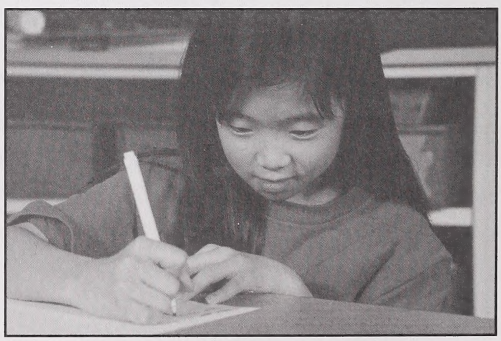


Computers

If you have your own computer at home, you may already know some computer software programs that help you to learn mathematics. There are also many websites on the Internet that provide math activities for students to do. Throughout this course, you will find optional activities that refer to software programs and Internet websites. You should do these activities only when you have finished the daily assigned work. **Note:** Always check with your home instructor before you log onto the Internet. **Remember that any Internet website address given in this module is subject to change.**

Journal Writing

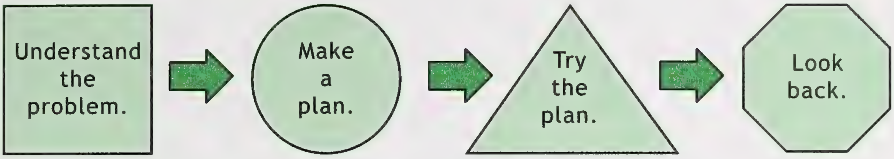
In each Assignment Booklet, you will often be asked to complete a journal entry about something you have been learning in the module. Being able to put into your own words what you have learned is an important skill. It will help you think about what you know as well as help your teacher understand your thinking.



Problem-Solving Skills

You are already familiar with problem solving from earlier grades. This course will continue to help you develop strategies to make you a better problem solver. There are four steps that can be used to solve most problems.

The Four-Step Process



Step 1

Understand the problem.

In this step, you need to spend time reading over the problem in order to understand what you are being asked to find. One way to see if you understand the problem is to cover it up and then try restating it in your own words. Sometimes it might seem like not enough information is given. If this happens, try asking yourself the question, “What do I already know that will help me solve this problem?”

Step 2

Make a plan.

In this step, you decide on the method or strategy you will use to solve the problem. Different problems require different strategies. Most problems can be solved in more than one way. In this course, you will be looking at the following seven strategies:

- acting out the problem
- guessing and checking
- making an organized list
- drawing a diagram
- making a table or chart
- looking for a pattern
- making it simpler

You will be introduced to these strategies as you move through the modules. However, you may review each of the strategies at any time by turning to the Appendix of Module 1.

Remember, there is no one “right” way to solve a problem. The method or strategy you use may be different than the one your home instructor or someone else doing the problem would use. Sometimes you will find that more than one strategy on the list can be used to solve a problem. In fact, sometimes you may decide to invent a strategy of your own that is not even on the list.

Step 3

Try the plan.

In this step, you try out one of your strategies to see if it works to solve the problem. Don't worry if you can't find the answer immediately. Some problems take more than one step. You may also find it necessary to use your calculator to do some of the calculations.

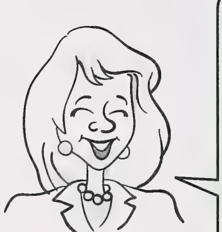
Sometimes, as you try to solve the problem, you'll find that your strategy isn't working. Don't give up. Try another method instead.

Step 4

Look back.

In this step, you take time to look at your answer and ask, "Is my answer reasonable? Does it make sense?" Writing your answer in a complete sentence may help you to see if, in fact, you have answered the question. If not, you may have to check your calculation for errors or, perhaps, try another strategy.

This is also a good time to look at the strategy you used and to think about how you could use it again in other problem-solving situations. Take time to share your strategies with your home instructor, and compare your method with the strategy your home instructor might use.



Remember, problem solving is a skill you need and will use throughout your life. The more practice you have with solving problems, the better your problem-solving skills become. Problems don't always have just one "right" answer. Some problems have several possible answers, just as some problems may be solved in several different ways.

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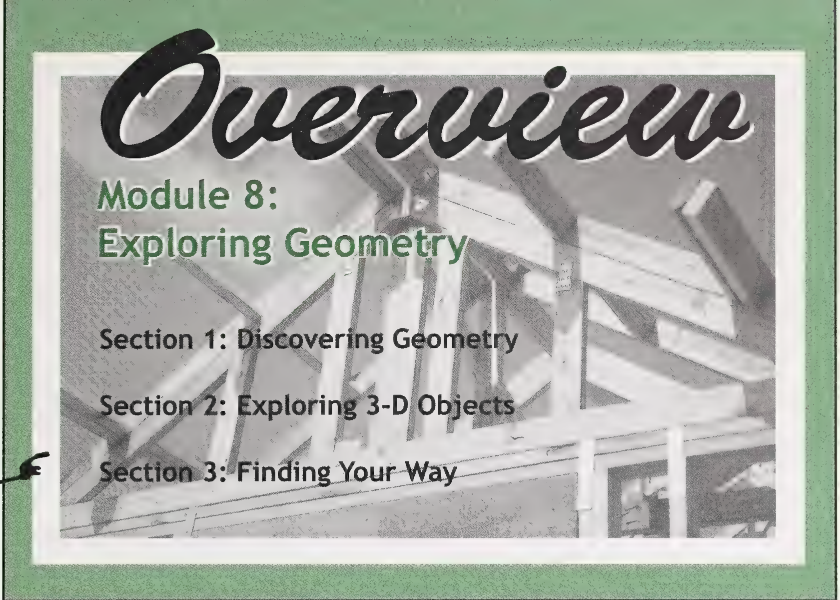


Module 8: Exploring Geometry

Geometry is the study of shape and space. Look around the room. What shapes and lines do you see?

In this module, you will

- learn about lines, angles, and points
- explore two-dimensional (2-D) figures such as triangles and rectangles
- explore and create models of three-dimensional (3-D) objects
- use grids
- make maps
- practise mental math skills
- review problem-solving skills

There are **three** Assignment Booklets for Module 8.
You should send in Assignment Booklet 8A after completing Day 7.
You should send in Assignment Booklet 8B after completing Day 15.
You should send in Assignment Booklet 8C after completing Day 23.

Section 1
Discovering Geometry

Looking at Lines

There are many types of **lines** in the world around you. One way to look at lines is to examine the edges of objects.

Look on your desk or table. Find the edge of an object such as a book, pencil, or piece of paper. Follow the line made by the edge of the object with your fingers.

Is the line straight or curved?
Is it long or short?
Does the line bend or change direction?
Does it meet another edge?

Look at the edges of the objects in the following picture. Can you find a straight line? A curved line? A line that meets another line?

Look around the room. Can you find straight lines, curved lines, long and short lines, and lines that meet?

You may notice lines in the following places:

- in wallpaper patterns
- along doorways
- in the shape of furniture
- in pictures and paintings

1. Tell where you might find each type of line in your home.

a. a straight line: ______________________________

b. a curved line: ______________________________

c. a long line: ______________________________

d. a short line: ______________________________

e. lines that make a pattern: ______________________________

f. lines that meet at a corner: ______________________________

g. side-by-side lines: ______________________________

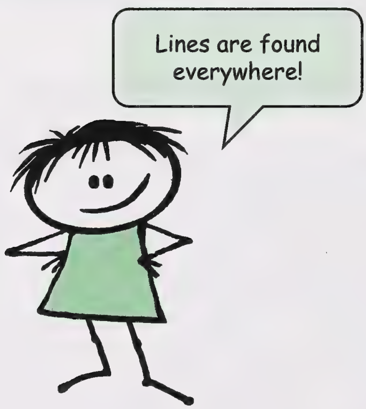
h. lines that cross each other: ______________________________

Now, look out a window. Where do you see lines? You might see lines in the edges of a fence post, a tree branch, or a garage door.

2. Write down **three** other places outdoors where you see lines.

- ____
- ____
- ____

Check your answers in the Appendix.



Mathematicians have a special way to draw lines on paper. They use arrows to show that lines go for a long way in both directions. Lines have no definite length—they can be long or short.

Line segments are parts of a line.

They have a starting point and a stopping point. These points are called **endpoints**.

Here are some more line segments.

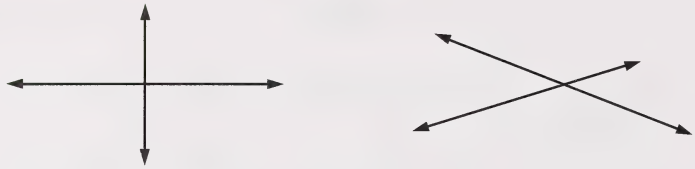
3. Use your ruler to draw **two** different lines and **two** different line segments in the space below.

Lines

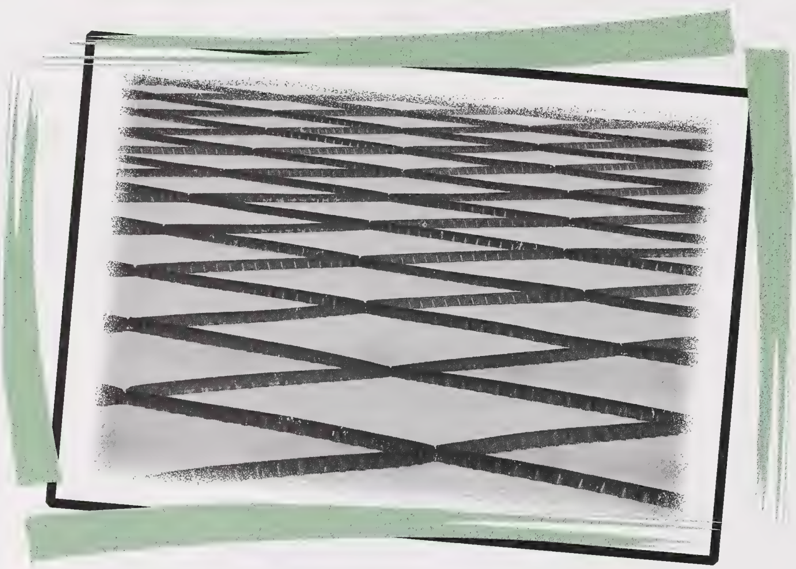
Line Segments

Check your answers in the Appendix.

Intersecting lines are lines that meet or cross each other.



You may already know that streets have intersections. An intersection is a place where one street crosses another. Lines are like streets. They sometimes **intersect** each other.



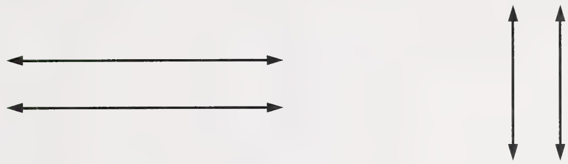
4. Fold a piece of paper twice to make two intersecting lines. Then fold it two more times. How many intersections did you make? ___________

5. Find two examples of intersecting lines in your home.

- ________________________________
- ________________________________

Check your answers in the Appendix.

Parallel lines are always the same distance apart.



Find some parallel lines in the following picture.

6. Look around your home for examples of parallel lines. The opposite sides of this booklet are parallel. Write two more examples.

- ______________________________
- ______________________________

Try folding a piece of paper to make parallel lines. Can you make several parallel lines?

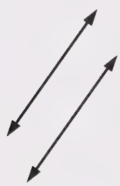
7. Now it's your turn to draw some lines. Remember to add the arrow shape at the ends of the lines. Use the ruler to draw the following kinds of lines.

- two intersecting lines

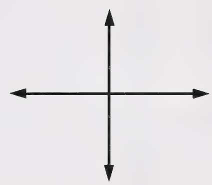
- two parallel lines

8. Label the following lines as **intersecting** or **parallel**.

a.

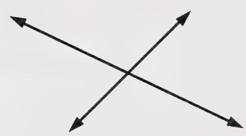


b.



c.

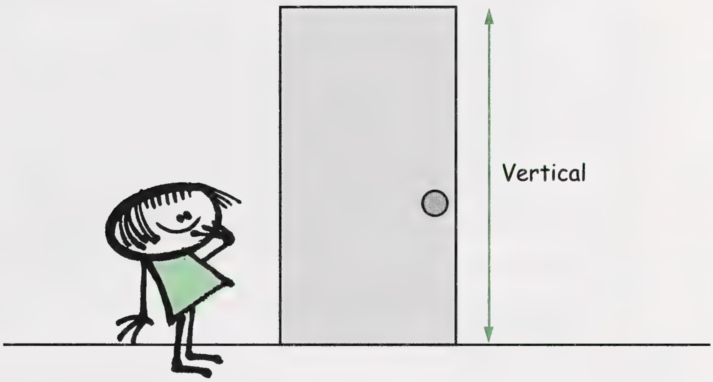
d.



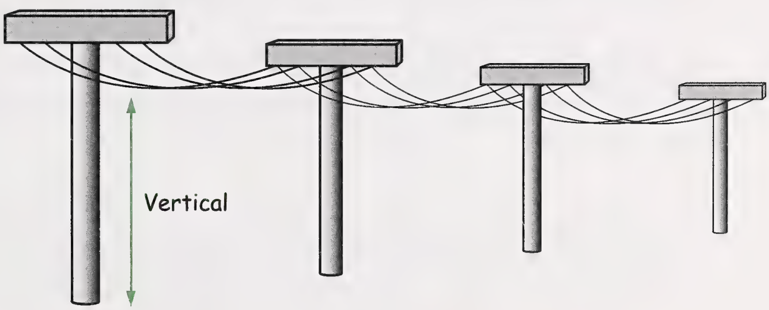
Check your answers in the Appendix.

Vertical lines go up and down.

Vertical lines go from the ceiling to the floor or from the top of an object to the bottom. Look around the room. You may find vertical lines in the blinds or curtains in your living room. The height of a doorway can be measured along a vertical edge.



Power poles are in a vertical position.

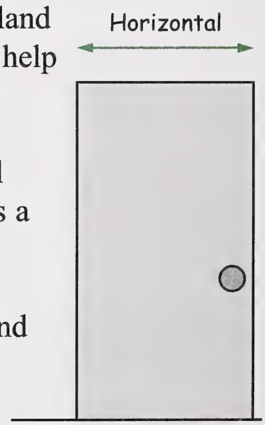


9. Look around your home or out the window. Find **two** more examples of vertical lines.

- ________________________________
- ________________________________

Horizontal lines follow the horizon. They go from side to side.

Look out your window. Can you find where the sky and land meet? That is the **horizon**. Ask your home instructor for help if you are having trouble finding the horizon.



The width of a doorway is measured along the horizontal edge. The bottom edge of this Student Module Booklet is a horizontal line.

10. Look around your home or out the window again. Find **two** more examples of horizontal lines.

- ______________________________
- ______________________________

Check your answers in the Appendix.

Points are certain places along a line.

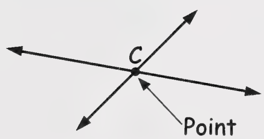
Each point is like a tiny dot. If you put hundreds of tiny points very close together, a line is formed.

Try it yourself. Draw as many tiny points or dots as you can between the two arrows below. Put them in a single row.

If you draw enough points between the arrows, a line is formed.

Certain points on a line can be labelled with letter names. Two points on a line, labelled A and B, would look like this.

Lines intersect at one point. This point can also be labelled with a letter.



11. Draw a horizontal line. Then draw three points on the line. Make sure you space them a short distance apart. Label the points **F**, **G**, and **H**.

12. Draw two intersecting lines. Make one of the lines vertical and the other horizontal. Draw a point where the lines meet. Label the point **Z**.

Check your answers in the Appendix.

Note to the Home Instructor

Body movements can be used to help students remember the names of specific lines and angles. It also makes learning fun!

Use the body positions shown on the next page to review and quiz your student about geometry terms. You could also try having your student do the body positions as you say the names of different lines and angles.

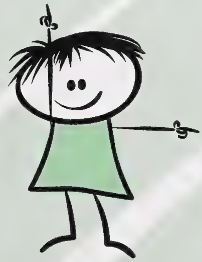
Horizontal
(arms extended to sides)

Vertical
(arms up and down)

Parallel
(both arms up)

Intersecting
(arms crossed)

Perpendicular or
Right Angle



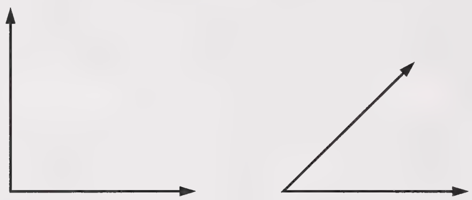
Less Than A
Right Angle

More Than A
Right Angle

Turn to Assignment Booklet 8A, and complete the activities for Day 1.

Looking at Angles

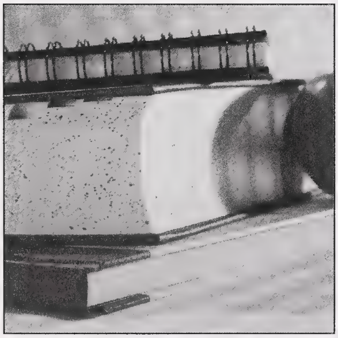
When two lines meet or intersect at one point, an angle is formed.



You can think of angles as sharp turns. When a line changes direction, an angle is made.

Find examples of lines that change direction in your home or outside.

The hands of a clock create an angle.

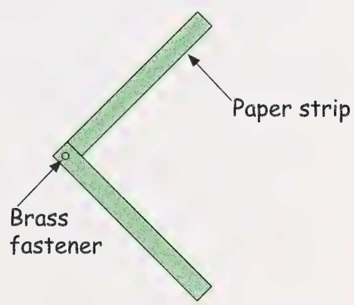


The corner of a book is another example of an angle.

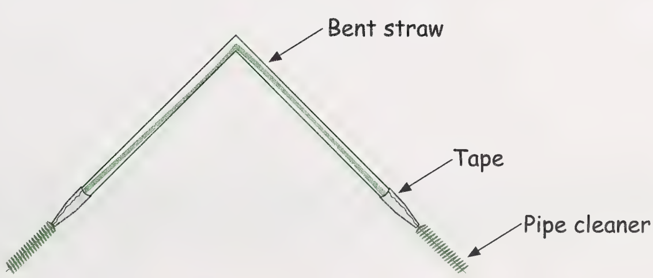
You can show angles with your body. When you bend your elbow, your arm makes an angle. If you bend your leg or your wrist, you make an angle where your leg or arm bends.

Choose **one** of the following methods to make a tool to measure angles.

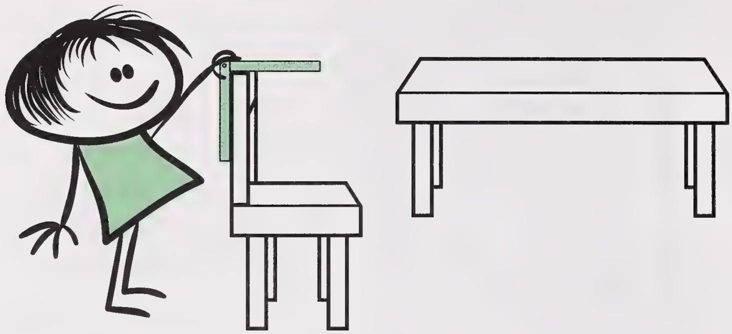
Method 1: Cut two strips of heavy paper or poster board. Fasten the strips of paper at one end with a brass fastener.



Method 2: Bend a plastic straw. Slide pipe cleaners inside the straw and tape them in place.



You can create many sizes of angles by opening and closing the straw or paper strips.



Take your measuring tool around your home to find more angles. Place the sides of your measuring tool against the corners of furniture, books, walls, and other household objects.

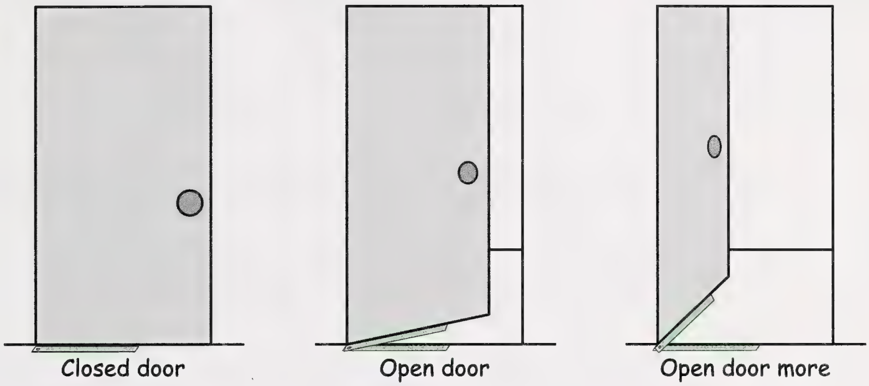
1. In the space below, draw **two** angles that you found.

Check your answer in the Appendix.

Now try this activity.

Find a door in your home. Close the door. Place your measuring tool on the floor along the edge of the door. The hinged end of your tool should be toward the hinge of the door.

Now, open the door a bit. Show the angle with your tool.



Open the door more. Show the new angle you made.

2. What is the largest angle you can make? Sketch it below.

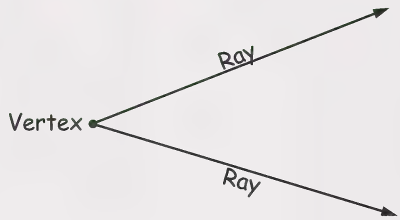
3. You have discovered that angles are found at the corners of objects where two lines meet. Write **four** places you found angles in your home.

- ______________________ • ______________________
- ______________________ • ______________________

Check your answers in the Appendix.

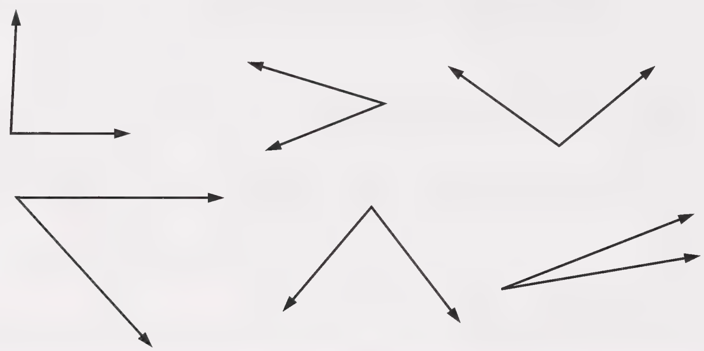
Mathematicians draw angles a special way. They use a line that has only one endpoint. A line with one endpoint is called a **ray**.

An angle is made by two rays with the same endpoint.



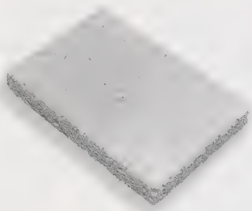
The point where the rays meet is called the **vertex**.

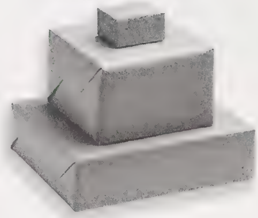
4. Circle the vertex in each of the following angles.



Check your answers in the Appendix.

Right Angles





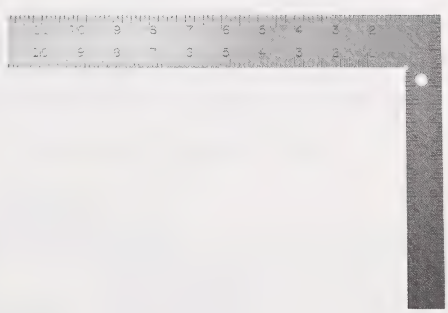
What do you notice about the corners of the objects shown in the pictures?

Right angles are a special kind of angle.

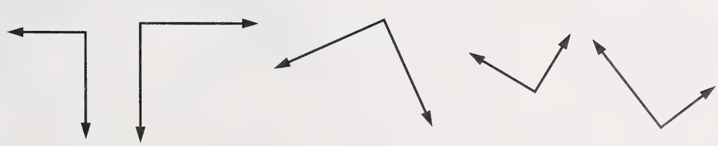
Many objects have **right angles**. Right angles are very important to carpenters, artists, and almost everyone else.

Right angles are often called "square corners."

Carpenters use a tool called a square to make sure they are using the correct angles when they build houses and other buildings. If the walls of a building are not built at perfect right angles to the floor, the building may lean over or even fall over!



All of these rays form right angles.



Now it's your turn to find some right angles. Use an index card with square corners as your right angle tool. If you don't have an index card, you can use a sheet of paper folded in half.

Each corner of the card is a right angle.

Find different objects in your home that you think have right angles. Place the corner of the card along the edges of these objects. Try to match the corners carefully.

5. Write down **six** corners that match your right angle tool exactly. One example of a right angle is the corner of your math textbook.

- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________

Think About This!

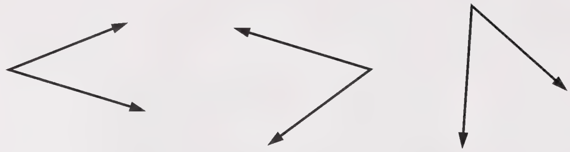
6. What if home builders and carpenters didn't use right angles? Sketch a picture of what you think your home would look like with no right angles.

Check your answers in the Appendix.

More Angles

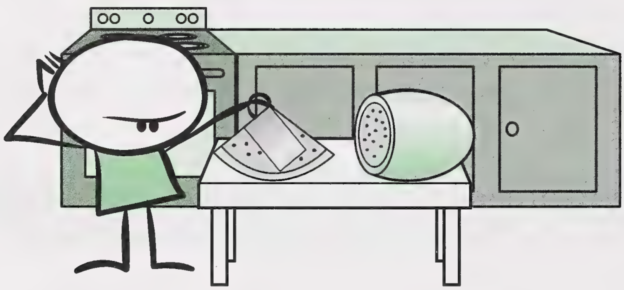
Use your right angle tool again. Search your home for angles that are less than a right angle. The corner of your card will be bigger than the angle you are measuring. **Hint:** Look for triangular shapes or sections of a circle.

On paper, these smaller angles look like this.

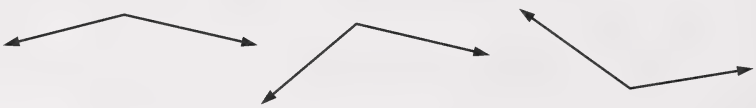


7. Tell where you found an angle that is smaller than a right angle.

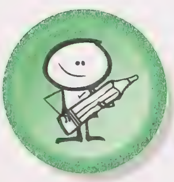
Now, use your right angle tool to search for angles that are larger than a right angle. The corner of your card will be smaller than the angle you are measuring.



On paper, angles larger than a right angle look like this.

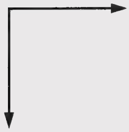


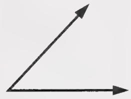
8. Name one place you found an angle larger than a right angle.



Check your answers in the Appendix.

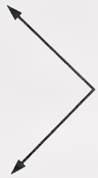
9. Put your right angle tool away. Without measuring, find **only** the right angles below. Circle the right angles.

a. 

b. 

c. 

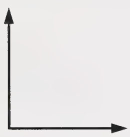
d. 

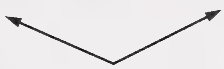
e. 

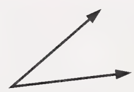
f. 

Check your answers in the Appendix.

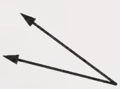
10. Circle the angle that is greater than a right angle.

a. 

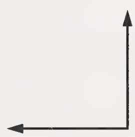
b. 

c. 

11. Circle the angles that are smaller than a right angle.

a. 

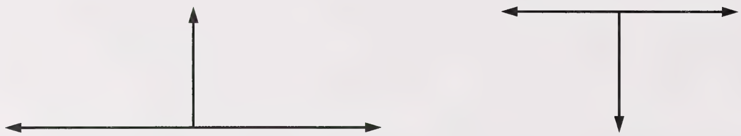
b. 

c. 

d. 

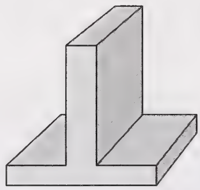
Check your answers in the Appendix.

The lines (or rays) that form right angles are called **perpendicular lines**.



Any two lines that meet to form right angles are **perpendicular** to each other.

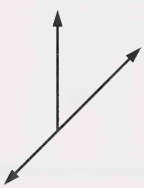
The edges of this bookend form perpendicular lines.

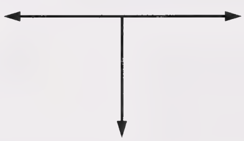


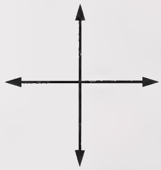
12. Look around the room. Can you see any perpendicular lines? Write down one example.

____

13. Circle the pairs of lines that are perpendicular to each other.

a. 

b. 

c. 

Check your answers in the Appendix.

Taking Another Look

The following activity is optional. You may choose to do it or not. You **should** complete the activity if you had difficulty with the questions in Day 2, or if you feel you just need more practice with the names of angles.

If you choose **not** to do the questions at this time, you may wish to return here later to review the concepts on drawing angles before completing the review activities for Day 6.

Drawing Angles

14. Use a ruler to draw the following angles. Try to do the activity without looking back at today's lesson.

a. Draw **two** right angles.

b. Draw **two** angles larger than a right angle.

c. Draw **two** angles smaller than a right angle.

d. Draw **two** pairs of perpendicular lines.

Check your answers in the Appendix.

Note to the Home Instructor

If the student needs extra practice with the types of angles, refer to the Note to the Home Instructor at the end of Day 1. Using a movement approach may help your child understand the concepts and recall the names of the angles and lines.

Basic Number Facts Practice

Turn to the Number Facts Progress Chart for Module 8 in the Appendix. Remove the chart from the Appendix and hang it in your study area. You will use this chart to record your scores for the number facts drills in Module 8.

Ask your home instructor to time you as you complete the following exercises. Your goal is to complete all 25 questions in each exercise in 2 minutes. At the end of 2 minutes, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 2 minutes. Mark these questions using the answer key as well.

Basic Number Facts Practice

Division Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Multiplication Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Record your score on the Number Facts Progress Chart.

15. Division Number Facts

Timed Exercise: 2 minutes

$9\overline{)81}$	$6\overline{)42}$	$9\overline{)36}$	$6\overline{)54}$	$7\overline{)56}$
$64 \div 8 =$	$30 \div 5 =$	$27 \div 3 =$	$40 \div 5 =$	$48 \div 6 =$
$4\overline{)36}$	$9\overline{)63}$	$5\overline{)25}$	$8\overline{)32}$	$9\overline{)72}$
$49 \div 7 =$	$40 \div 8 =$	$56 \div 8 =$	$20 \div 5 =$	$24 \div 8 =$
$3\overline{)21}$	$4\overline{)32}$	$6\overline{)36}$	$7\overline{)63}$	$4\overline{)28}$

Check your answers in the Appendix.

16. Multiplication Number Facts
Timed Exercise: 2 minutes

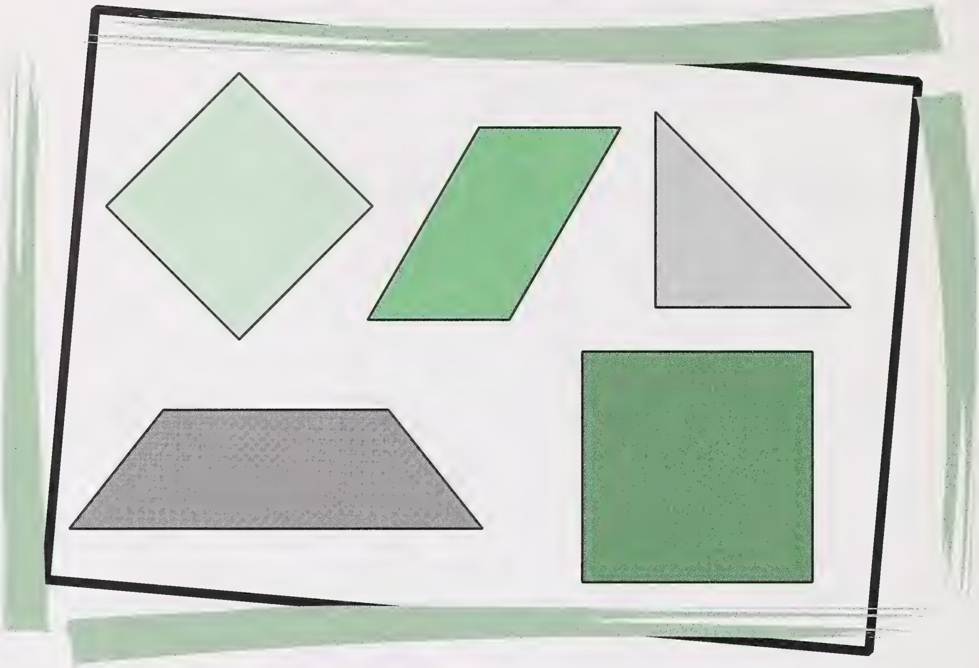
$\begin{array}{r} 6 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ \times\ 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ \times\ 6 \\ \hline \end{array}$
$9 \times 9 =$	$7 \times 1 =$	$8 \times 4 =$	$5 \times 3 =$	$5 \times 8 =$
$\begin{array}{r} 5 \\ \times\ 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ \times\ 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ \times\ 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ \times\ 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ \times\ 9 \\ \hline \end{array}$
$4 \times 9 =$	$8 \times 5 =$	$8 \times 8 =$	$3 \times 7 =$	$4 \times 4 =$
$\begin{array}{r} 7 \\ \times\ 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ \times\ 5 \\ \hline \end{array}$

Check your answers in the Appendix.

Turn to Assignment Booklet 8A, and complete the activities for Day 2.

Triangles and Quadrilaterals

Lines join to make shapes or **figures**.



Get several toothpicks. Arrange the toothpicks into shapes on the top of your desk.

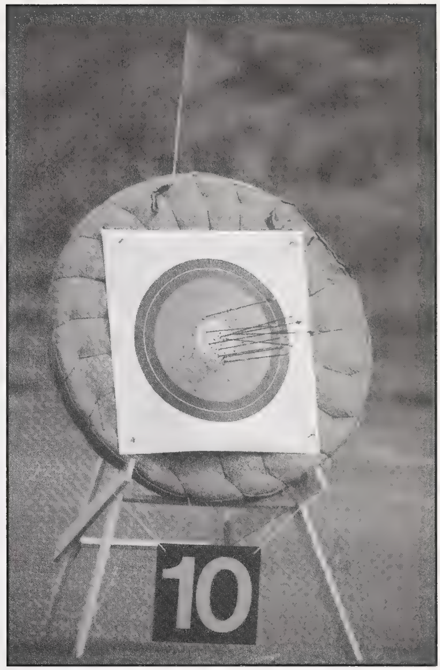
- Use **three** toothpicks to make a shape.
- Use **four** toothpicks to make another shape.
- Use **five** toothpicks to make more shapes.

All of the shapes you make will have straight sides that are the same length.

Break some of the toothpicks in half. Now try making shapes using some long toothpicks and some short toothpicks.

How many different shapes or figures were you able to make?

What shapes can you see in this photo?



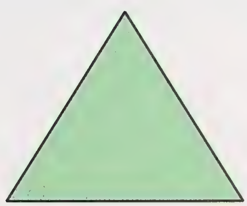
Two-Dimensional Shapes

Flat shapes or figures have two dimensions.

Figures made with lines have only width and length. They have no thickness or depth. These shapes are called two-dimensional (2-D) figures. You have learned about these shapes in previous grades.

Circle: a round shape created by a curved line

Triangle: a figure with three sides



Square: a figure with four equal sides and four right angles

Rectangle: a figure with four sides and four right angles

1. Look around your home or out the window. Find examples of each of the 2-D figures listed in the chart. Write at least **two** examples of each in the chart.

   a.

Triangle	Square	Rectangle

   b. Did you find that there are more rectangles than triangles or squares?

   ____

Check your answers in the Appendix.

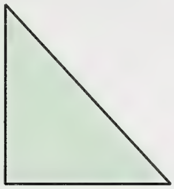
The two-dimensional shapes you created with the toothpicks are all polygons.

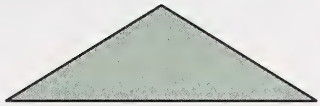
A **polygon** is a two-dimensional figure with three or more straight sides.

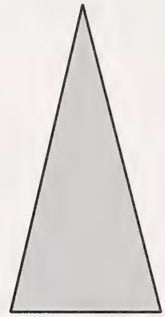
Triangles

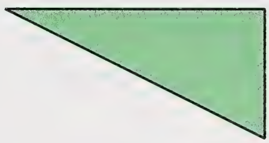
Triangles are three-sided polygons. You know that triangles have three sides. They also have three angles. You probably also know that *tri* means "three." *Triangle* means "three angles."

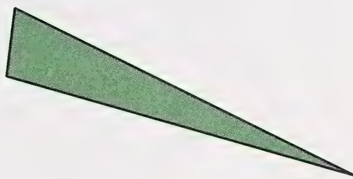
2. Following are some right angles, some angles greater than a right angle, and some angles less than a right angle. Circle the triangles that have a right angle.

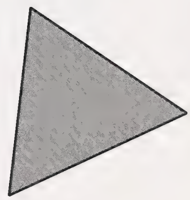
a. 

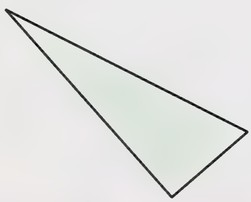
b. 

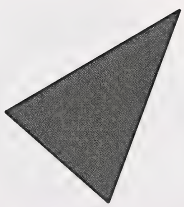
c. 

d. 

e. 

f. 

g. 

h. 

Check your answers in the Appendix.

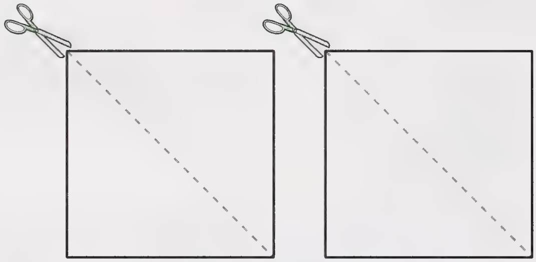
Triangles that have a right angle are called **right triangles**.

Turn to Day 3 of the Cut-Out Learning Aids section of the Appendix.

Cut out the two squares.

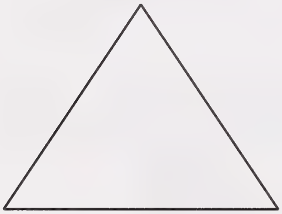
Fold both squares along the diagonal.

Cut both squares along the fold.



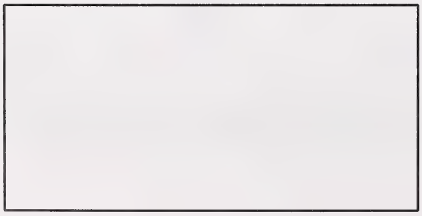
3. You now should have four right triangles that are the same size. Use the triangles to make the following figures. Your figures will be larger than the ones shown. Write the number of right triangles you used to make each shape.

a.

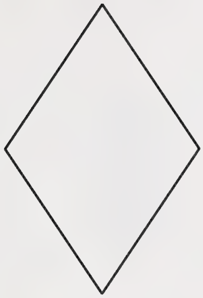


__________ right triangles

b.



__________ right triangles

c. 

__________ right triangles

Check your answers in the Appendix.

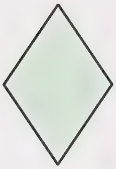
Quadrilaterals

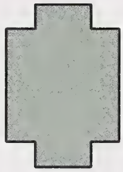
When you looked for 2-D shapes at the beginning of today's lesson, you likely found that many objects have four sides.

Four-sided polygons are called quadrilaterals.

Notice the word part *quad* in this new word. It means "**four**." You know other *quad* words like quadruplets (four babies) and quad (an off-road vehicle with four wheels).

4. Circle the quadrilaterals.

a. 

b. 

c. 

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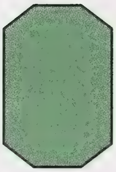
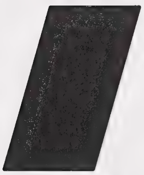
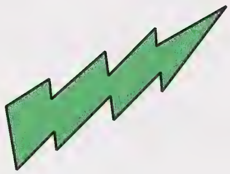
e. 

f. 

g. 

h. 

i. 

j. 

Check your answers in the Appendix.

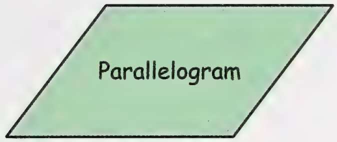
5. Use a ruler to draw **two** quadrilaterals that are different from those in question 4.

Check your answers in the Appendix.

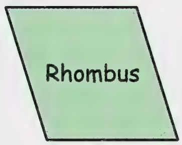
More Quadrilaterals

Squares and rectangles are quadrilaterals. You need to know some other quadrilaterals.

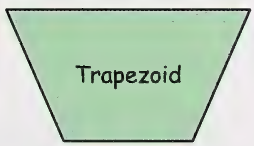
A **parallelogram** is a four-sided figure whose opposite sides are parallel and are the same length.



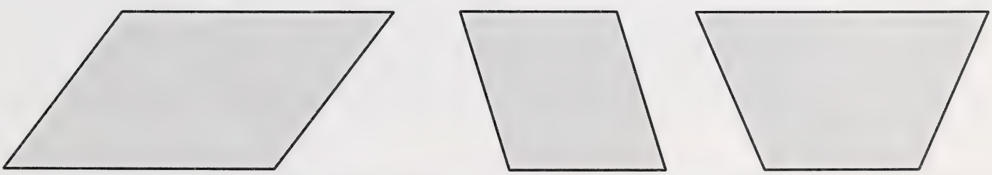
A **rhombus** is a four-sided figure whose opposite sides are parallel. All sides are the same length.



A **trapezoid** is a four-sided figure with only one pair of parallel lines.



6. Use a coloured pencil or marker to outline **one** pair of parallel lines on each of the following quadrilaterals.



Check your answers in the Appendix.

Geoboard Activities

A **geoboard** is a board with nails or pegs. Two-dimensional shapes can be made by stretching elastics over the nails or pegs.

Instructions for building a geoboard are found in Day 3 of the Appendix. If you have the materials needed to make a geoboard, work with your home instructor to make one.

If you can't make a geoboard, do the geoboard questions by drawing the shapes on the dotted geoboard pattern paper. Look for Day 3: Geoboard Patterns in the Cut-Out Learning Aids section of the Appendix.

Note to the Home Instructor

You may wish to purchase a geoboard instead of building one. Geoboards are available at educational supply stores, such as the Learning Resources Distributing Centre, or toy stores that carry educational materials.

The geoboard is a recommended manipulative. Students can use it to practise angles and lines, create shapes, divide figures, and work with symmetry.

You will need several sturdy elastic bands to work with the geoboard. It is useful to have different sizes and colours of elastic bands if possible.

Do each question on the geoboard or on the geoboard patterns from the Appendix. Be sure to check your answers in the Appendix after each question.

7. Make a large **triangle** on the geoboard. Make several smaller triangles inside the large one. How many can you make? ___________

8. Make a **right triangle**. Divide it equally into two smaller triangles. Are the smaller triangles right triangles? ___________

9. **a.** Make a triangle that contains an **angle** smaller than a right angle.
   b. Make a triangle that contains an **angle** larger than a right angle.

10. Make a large **square**. Divide it into smaller shapes. Try **rectangles**, **triangles**, and **squares**.

11. Make as many different **quadrilaterals** as you can on the geoboard. How many did you make? ___________

12. Make a **trapezoid**. Divide it into other shapes with your elastic bands. What shapes did you make?

____

____

13. Make a **parallelogram** and a **rhombus**.

14. It's time to practise what you have learned about quadrilaterals. Turn to page 76 in your textbook. Do Skills Bank questions 3.a. and 3.b.

Skills Bank, Question 3

3. a. Circle the letter of the figure that is **not** a quadrilateral.

A. B. C. D. E. F. G.

b. Sort the quadrilaterals by writing their letters in the correct columns. A letter may be used in more than one column.

All Sides Equal	Two Pairs of Equal Sides	No Equal Sides	Four Right Angles	One Pair of Parallel Sides	Two Pairs of Parallel Sides

Check your answers in the Appendix.

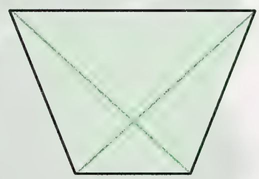
Just For Fun

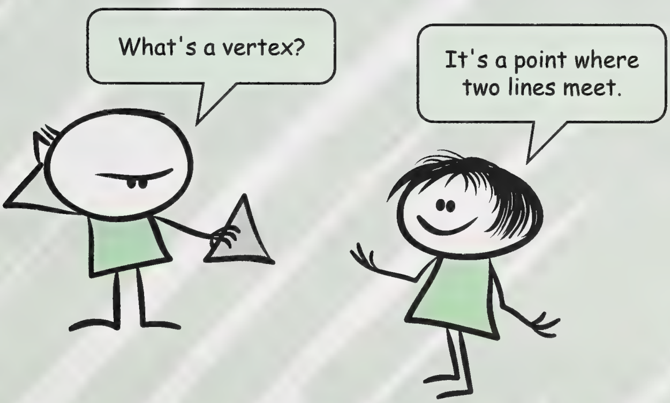
Find the polygon cutouts in Day 3 of the Cut-Out Learning Aids section of the Appendix.

Colour and cut out the polygons as directed.

Choose one of each kind of polygon. Save the others in an envelope.

Use a ruler to draw a line from each corner to the opposite corner. You are joining each **vertex** to the opposite vertex.





15. a. What kind of figures did you make by drawing the lines?

____

b. Are any of these new figures similar? ______________________

16. Cut the three polygons apart along the lines you have drawn. Use the whole polygons and the triangle pieces and arrange them in as many ways as you can.

- Can you make a pattern?
- Can you make a polygon creature?
- Can you make an outdoor scene?

Paste your arrangement of polygon pieces below.

Check your answers in the Appendix.

Turn to Assignment Booklet 8A, and complete the activities for Day 3.

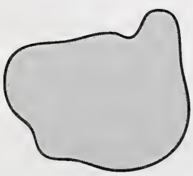
More Polygons

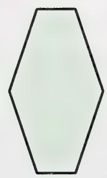
In Day 3 you learned about quadrilaterals and triangles. In this lesson, you will compare quadrilaterals. You will also learn about three new **polygons**—the **pentagon**, the **hexagon**, and the **octagon**.

A triangle is a polygon with three sides. A quadrilateral is a polygon with four sides. Pentagons, hexagons, and octagons are also polygons.

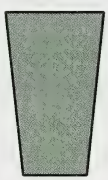
A **polygon** is any shape with three or more straight sides.

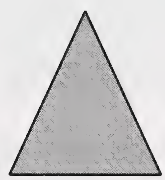
1. Circle the figures that are polygons.

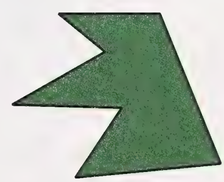
a. 

b. 

c. 

d. 

e. 

f. 

The most common polygon is the quadrilateral, or four-sided figure.

2. Look back in Day 3. Name the quadrilaterals you have learned about so far.

____

____

____

Check your answers in the Appendix.

3. Take out several toothpicks. Break some (but not all) in half. Place your toothpicks on your desk. Make the quadrilaterals described in each of the following questions.

   a. Make a quadrilateral with **four** right angles and **four** sides of equal length. It is called a ________________________________.

   b. Make a quadrilateral with **four** right angles and opposite sides of equal length. It is called a ________________________________.

Check your answers in the Appendix.

A **square** and a **rectangle** are similar. They both have four sides and they both have four right-angle corners.

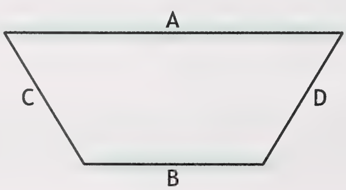
4. How are a square and a rectangle different?

____

____

Now use your toothpicks to make a **trapezoid**.

A **trapezoid** has no right-angle corners. Each corner is greater than or smaller than a right angle. Only two sides of the trapezoid are parallel.



Sides A and B are parallel.
Sides C and D are not parallel.

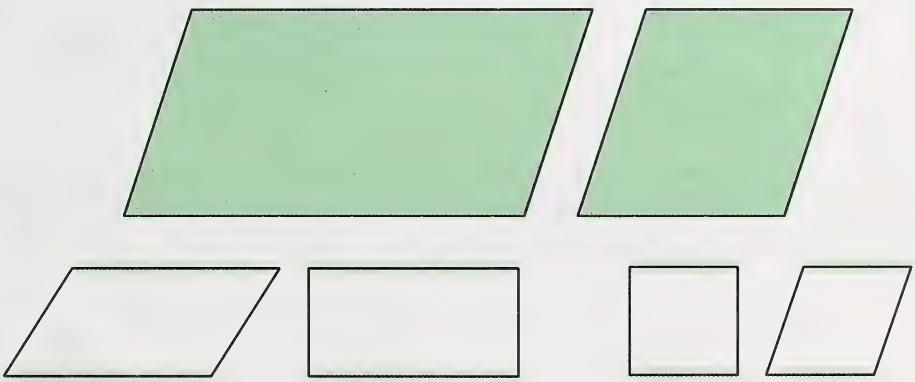
5. Use the toothpicks to make the quadrilaterals described in the following questions. Write the name of each quadrilateral.

   a. Make a quadrilateral that has no right angles, four sides of equal length, and parallel opposite sides. It is a ______________________.

   b. Make a quadrilateral that has no right angles and whose opposite sides are parallel and of equal length. It is a ____________________.

Check your answers in the Appendix.

The **parallelogram** and **rhombus** are similar. Both have opposite sides that are parallel.



Parallelograms

- Opposite sides are parallel.
- Opposite sides are the same length.

Rhombuses

- Opposite sides are parallel.
- All sides are the same length.

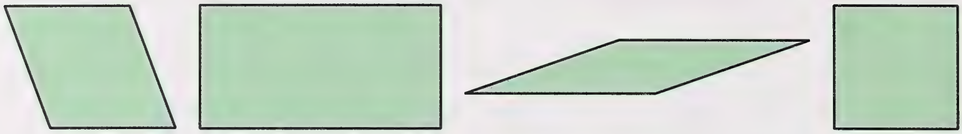
6. How are the parallelogram and rhombus different?

____

____

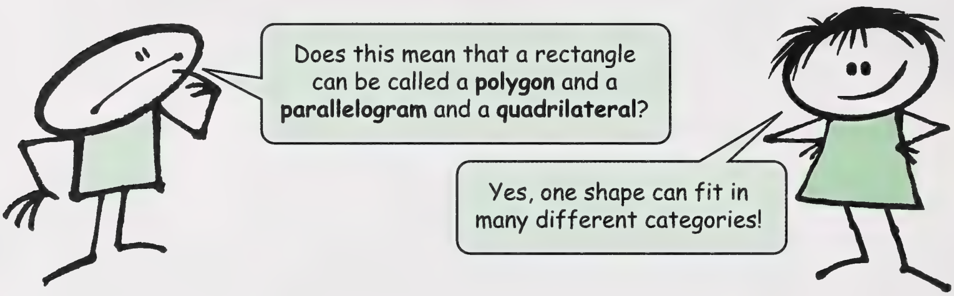
Check your answers in the Appendix.

All of the figures shown below are parallelograms.



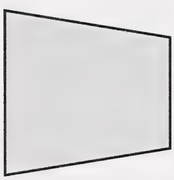
Squares and rectangles are parallelograms because they have

- opposite sides that are parallel
- opposite sides that are the same length

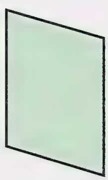


7. Sort the following quadrilaterals into the correct category on the chart. Write the letter of each figure in the correct column. **Some figures may fit in more than one category**.

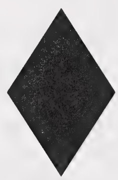
a.



b.



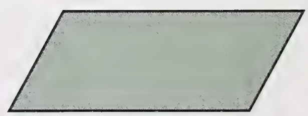
c.

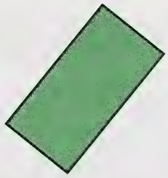


d.

e.

f.



g. 

h. 

i. 

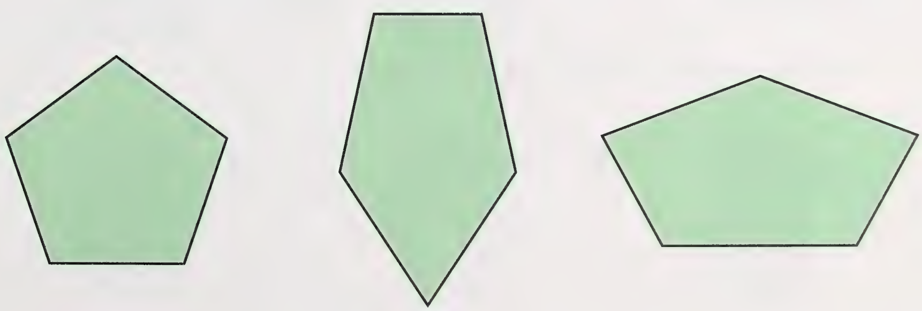
Quadrilaterals				
Square	Rectangle	Parallelogram	Rhombus	Trapezoid

Check your answers in the Appendix.

Pentagons, Hexagons, and Octagons

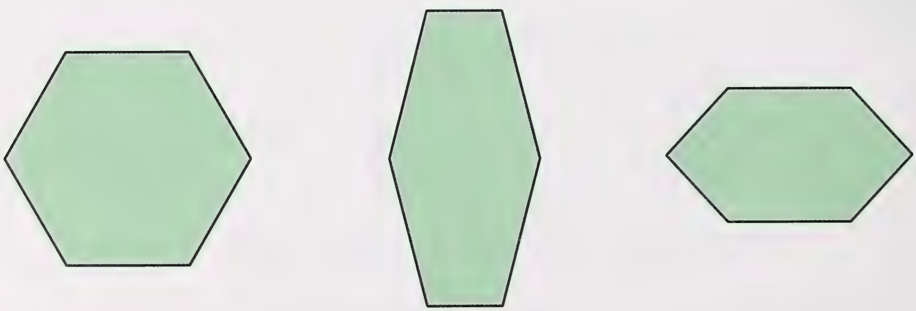
Pentagons, hexagons, and octagons are figures with many sides, or **polygons**.

Pentagons have **five** straight sides.



The world's most famous pentagon is in the United States. It is a building that is shaped like a pentagon.

Hexagons are polygons with **six** sides.



Octagons have **eight** sides.

The most familiar octagon is the stop sign.

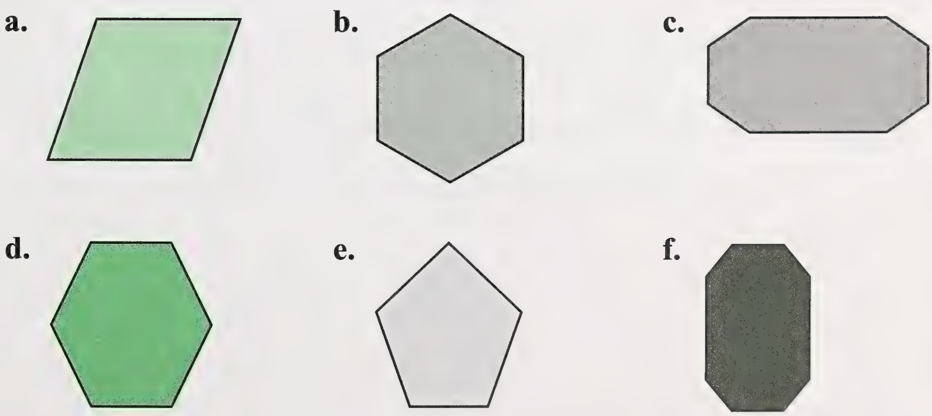
8. Can you find any pentagons, hexagons, or octagons in your home or neighbourhood? If so, list them below.

____

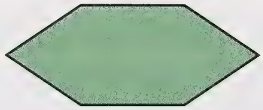
____

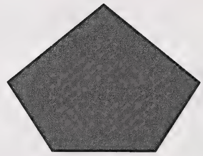
Check your answers in the Appendix.

9. Sort the following polygons into the correct categories in the chart. Write the letter of each figure in the correct column.



g. 

h. 

i. 

Quadrilateral	Pentagon	Hexagon	Octagon

Check your answers in the Appendix.

10. Use your geoboard or the geoboard pattern pages in the Appendix to do the following questions.

a. Make a right triangle.

b. Make as many different kinds of quadrilaterals as you can.

c. Make a five-sided polygon. What is it called? ____________________.

d. Make a hexagon. Divide it into other shapes. What kind of shapes did you make? ______________________________

e. Make an octagon. Divide it into triangles. How many did you make? ____________________

Check your answers in the Appendix.

If you would like more practice with polygons, lines, and angles, try the following Internet sites:

- **http://homepage.mac.com/efithian/geometry.html**
- **http://www.aplusmath.com/games/index.html**

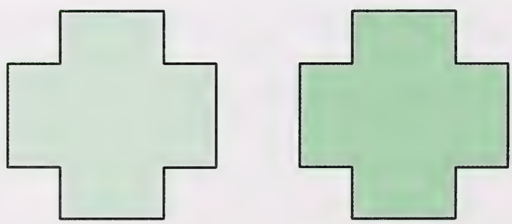
Turn to Assignment Booklet 8A, and complete the activities for Day 4.

Day 5

It Looks the Same to Me

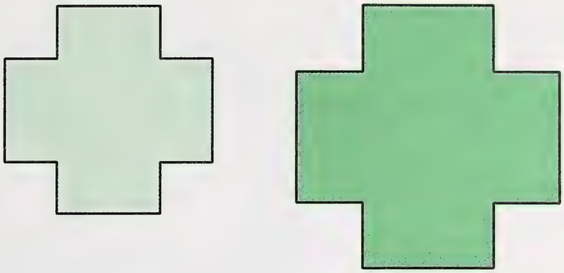
Have you ever played with a jigsaw puzzle? You may have noticed that many of the individual pieces have the same shape and size. If you turn them over to the side that isn't coloured, they look exactly like other pieces.

When two figures have exactly the same shape and size, they are congruent.



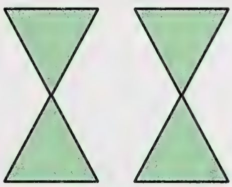
The figures above are **congruent**. They are the same size and shape.

These figures are **not congruent**. They are the same shape, but they are not the same size.



1. For each pair of figures, circle **Congruent** or **Not Congruent**. Explain your answer.

a.



Congruent **Not Congruent**

____

____

____

b.

Congruent **Not Congruent**

____

____

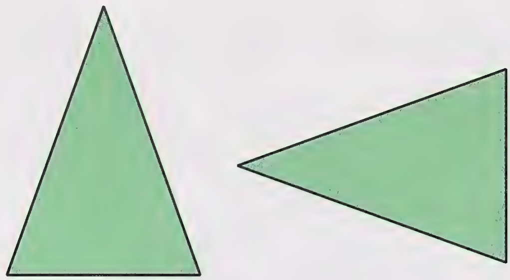
____

Check your answers in the Appendix.

Sometimes, it is difficult to decide if two figures are congruent. In these cases, you will need to trace one figure and try to match it to the other.

Example

Are the following figures congruent?



It is difficult to tell if these triangles are congruent. They look like they may be the same, but you will need to check to be sure.

Find a sheet of tracing paper or clear plastic. If you are using plastic, you will need a felt pen.

Place the tracing paper or plastic over one triangle. Trace the triangle carefully.

Place the traced triangle over the second triangle.

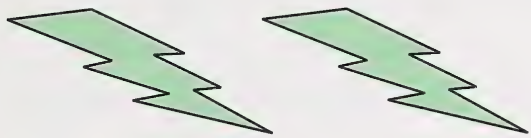
2. Does it match exactly? __________

3. Are the triangles congruent? __________

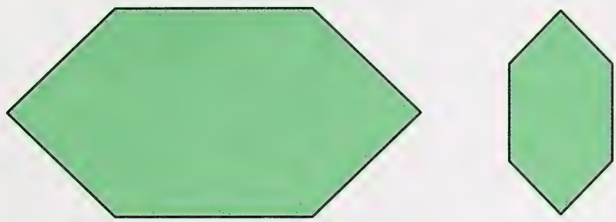
Check your answers in the Appendix.

4. Circle the pairs of figures that are congruent. Use tracing paper or a clear plastic sheet to check your answers.

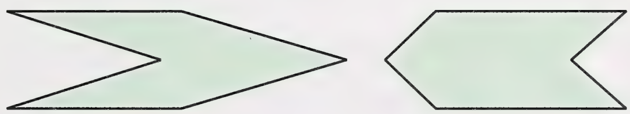
a.



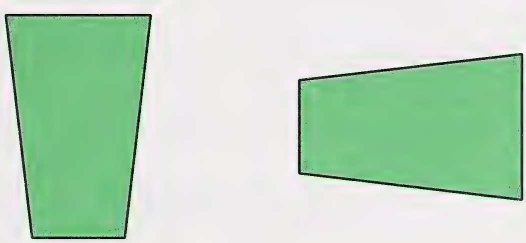
b.



c.



d.

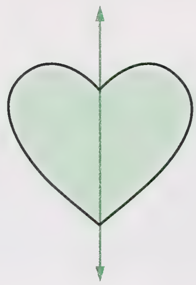


Check your answers in the Appendix.

Lines of Symmetry

Some figures can be divided into two parts that have the same size and shape.

The heart shape can be divided into two parts that match.

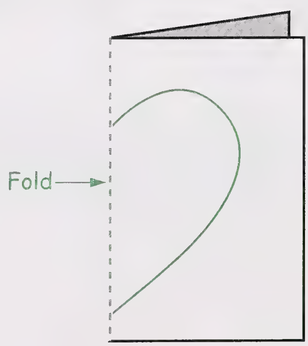


Each side is a mirror image or reflection of the other part.

The line that divides the heart into two equal parts is called a line of symmetry.

Try making a cut-out paper heart.

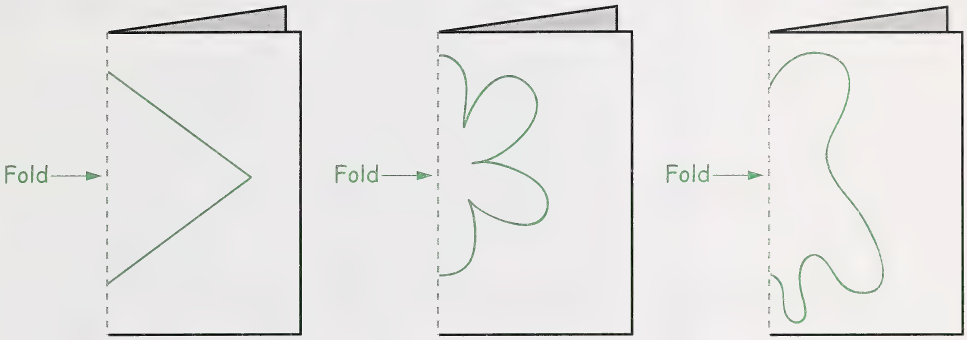
- Fold a piece of paper in half.
- Draw one side of a heart.



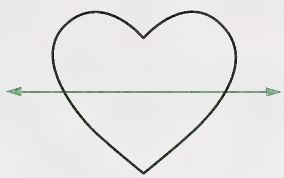
- Cut along the line you drew.

The fold makes the line of symmetry. Each side of the heart will be a mirror image of the other side.

Many **symmetrical** shapes can be made by folding and cutting in this way. Try making some different symmetrical shapes by folding, drawing one side, and then cutting. Use some of the ideas shown below or make your own shapes.



Now, take your cut-out heart and fold it this way.



5. Is the new fold a line of symmetry? __________

Why? ____

____

____

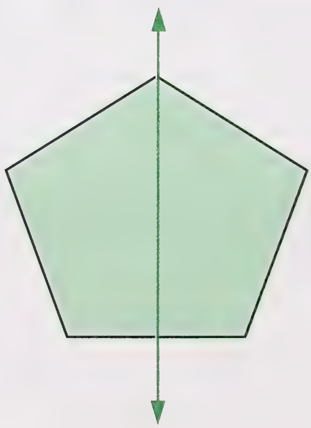
Check your answers in the Appendix.

When a figure is folded along its line of symmetry, the two sides will match.

It is not always possible to fold a figure to see if the sides match. Another way to find out if a line is a line of symmetry is to use a small straight-edged mirror.

For the following activity you will need a small straight-edged mirror.

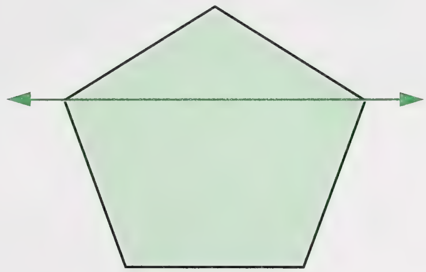
Place the edge of the mirror on the line in the figure below.



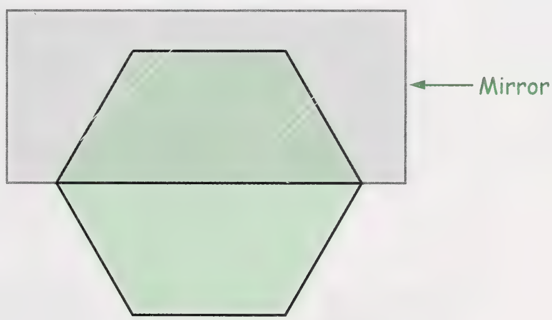
Look in the mirror. Do you see the reflection of the shape?

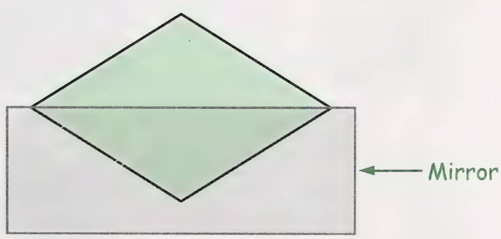
The shape on the paper and the reflection combine to make the original shape. This tells you that the line is a **line of symmetry**.

Now place the mirror on the line shown.



Depending on which direction the mirror is facing when you place it along the line, there are two images you may see.

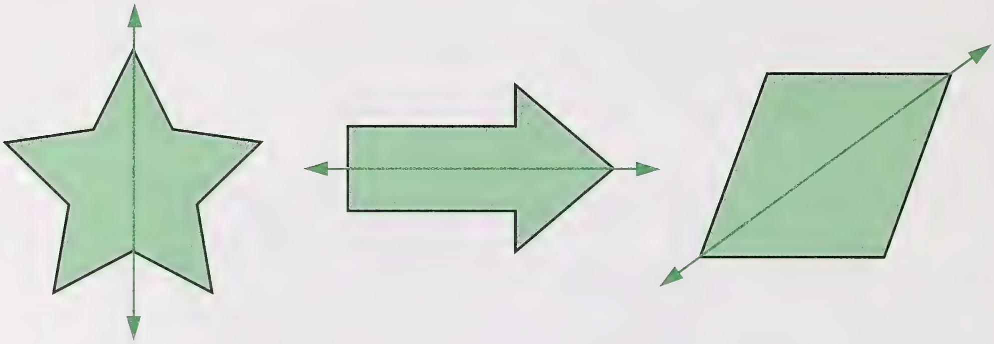




This line is **not** a line of symmetry because the shape you see in the reflection is **not** the same as the original shape.

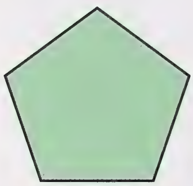
A line of symmetry may be horizontal or vertical. It may also be diagonal.

The line of symmetry will always separate the figure into halves that are mirror images of each other.

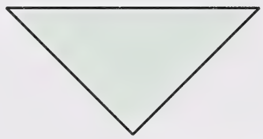


6. Look at the following figures. Try to determine if each shape is symmetrical by drawing a line of symmetry. You may use tracing paper or a mirror to help you. Circle the shapes that have a line of symmetry.

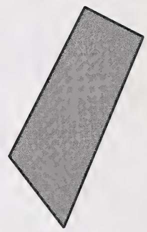
a.



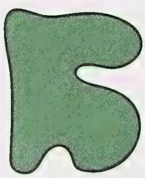
b.



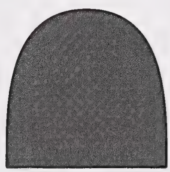
c.



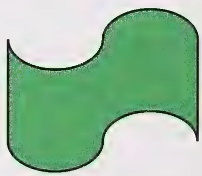
d.



e.



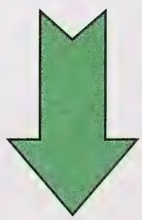
f.



g.

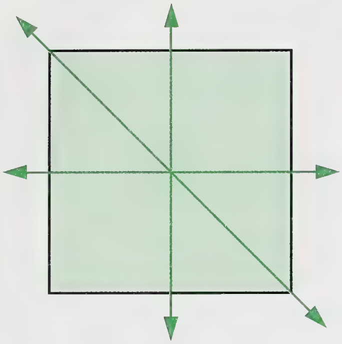
h.

i.



Check your answers in the Appendix.

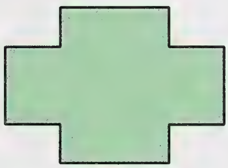
Sometimes a geometric figure will have more than one line of symmetry.

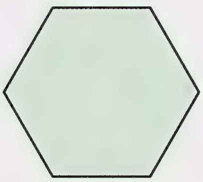


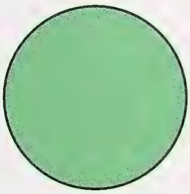
A square has more than one line of symmetry.

Try folding a square of paper along the lines shown at the left. Each of these folds will give you two parts that are the same size and shape.

7. Draw **at least two** lines of symmetry for each figure. Remember that the dividing lines must create two parts that are the same size and shape.

a. 

b. 

c. 

8. Draw another geometric figure that has more than one line of symmetry. Draw **two** lines of symmetry on your shape.

Check your answers in the Appendix.

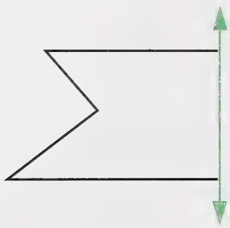
9. There are many symmetrical shapes in your home and yard. Look around your home or out the window. Find some shapes that could be divided into two identical parts. List **three** examples.

- ______________________________
- ______________________________
- ______________________________

Check your answers in the Appendix.

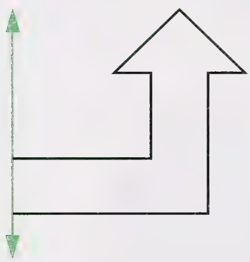
10. Complete these pictures by drawing the other half of the symmetrical figure. The line of symmetry is shown.

a.

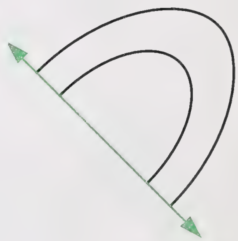


b.

c.



d.



Check your answers in the Appendix.

Just For Fun

11. Look at the printed letters of the alphabet. Which capital letters have lines of symmetry?

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

List the capital letters that have lines of symmetry.

____

12. Which lowercase (or small) letters have lines of symmetry?

a b c d e f g h i j k l m n o p q r s t u v w x y z

List the lowercase letters that have lines of symmetry.

____

Remember, the letters may have lines of symmetry that are horizontal, vertical, or diagonal.

Check your answers in the Appendix.

If you would like to learn more about symmetry, visit these websites:

- **http://www.ScienceU.com/geometry**
- **http://homepage.mac.com/efithian/geometry.html**

Taking Another Look

The following activities are optional. You may choose to do them or not. You **should** complete the activities if you had difficulty with the questions in Day 5 or if you feel you just need more practice with lines, angles, and 2-D figures.

If you choose **not** to do the questions at this time, you may wish to return here later to review the concepts on lines, angles, and 2-D figures before completing the review activities for Day 6.

You will need several elastic bands of different sizes and your geoboard. If you don't have a geoboard, use the geoboard pattern paper.

Be sure to check your answers in the Appendix after each question.

13. Show the following lines on your geoboard.

- parallel lines
- intersecting lines
- a horizontal line
- a vertical line
- perpendicular lines

14. Show these angles. (Don't make triangles.)

- a right angle
- an angle greater than a right angle
- an angle less than a right angle

15. Make the following quadrilaterals.

- rhombus
- parallelogram
- trapezoid

16. Make the following polygons.

- pentagon
- hexagon
- octagon

17. Show **two** congruent right triangles.

18. Make a pentagon. Use another elastic to show the line of symmetry.

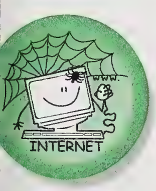
19. Create your own geometric figure with many sides. Is it symmetrical?

____

How do you know?

____

____



For more geoboard activities, visit these websites:

- **http://www.forum.swarthmore.edu/trscavo/geoboards/**
- **http://homepage.mac.com/efithian/geometry.html**
- **http://www.mathclub.com/download/download.html**

Basic Number Facts Practice

Ask your home instructor to time you as you complete the following exercises. Your goal is to complete all 25 questions in each exercise in 2 minutes. At the end of 2 minutes, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 2 minutes. Mark these questions using the answer key as well.

Basic Number Facts Practice

Addition Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Subtraction Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Record your score on the Number Facts Progress Chart.

20. Addition Number Facts
Timed Exercise: 2 minutes

$\begin{array}{r} 7 \\ +\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ +\ 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ +\ 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ +\ 9 \\ \hline \end{array}$
$7 + 7 =$	$2 + 9 =$	$8 + 3 =$	$6 + 7 =$	$5 + 9 =$
$\begin{array}{r} 4 \\ +\ 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ +\ 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ +\ 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ +\ 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ +\ 4 \\ \hline \end{array}$
$5 + 6 =$	$8 + 9 =$	$7 + 6 =$	$6 + 6 =$	$9 + 7 =$
$\begin{array}{r} 8 \\ +\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ +\ 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ +\ 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ +\ 8 \\ \hline \end{array}$

Check your answers in the Appendix.

STOP

21. Subtraction Number Facts

Timed Exercise: 2 minutes

$$\begin{array}{r} 16 \\ -\ \ 8 \\ \hline \end{array} \qquad \begin{array}{r} 18 \\ -\ \ 9 \\ \hline \end{array} \qquad \begin{array}{r} 13 \\ -\ \ 5 \\ \hline \end{array} \qquad \begin{array}{r} 12 \\ -\ \ 3 \\ \hline \end{array} \qquad \begin{array}{r} 17 \\ -\ \ 9 \\ \hline \end{array}$$

$12 - 7 =$ $\quad 14 - 8 =$ $\quad 11 - 3 =$ $\quad 15 - 7 =$ $\quad 17 - 8 =$

$$\begin{array}{r} 16 \\ -\ \ 7 \\ \hline \end{array} \qquad \begin{array}{r} 13 \\ -\ \ 8 \\ \hline \end{array} \qquad \begin{array}{r} 12 \\ -\ \ 4 \\ \hline \end{array} \qquad \begin{array}{r} 15 \\ -\ \ 8 \\ \hline \end{array} \qquad \begin{array}{r} 14 \\ -\ \ 6 \\ \hline \end{array}$$

$11 - 8 =$ $\quad 12 - 6 =$ $\quad 13 - 7 =$ $\quad 16 - 9 =$ $\quad 11 - 9 =$

$$\begin{array}{r} 15 \\ -\ \ 9 \\ \hline \end{array} \qquad \begin{array}{r} 13 \\ -\ \ 6 \\ \hline \end{array} \qquad \begin{array}{r} 12 \\ -\ \ 5 \\ \hline \end{array} \qquad \begin{array}{r} 15 \\ -\ \ 6 \\ \hline \end{array} \qquad \begin{array}{r} 11 \\ -\ \ 4 \\ \hline \end{array}$$

Check your answers in the Appendix.

Turn to Assignment Booklet 8A, and complete the activities for Day 5.

Putting It All Together (I)

In Section 1 you learned many new things about lines, angles, and two-dimensional shapes.

- You learned that lines can be straight, curved, vertical, or horizontal.
- You looked at lines that intersect, lines that are parallel, and lines that are perpendicular.
- You saw how angles are formed when two lines intersect.
- You learned that an angle with a square corner is called a right angle.

- You explored different kinds of polygons:
  – triangles
  – quadrilaterals
  – pentagons
  – hexagons
  – octagons

- You learned that 2-D figures can be congruent or symmetrical.

Many of the things you learned in Section 1 will be useful to you as you learn more about three-dimensional objects in Section 2.

Today you will show what you have learned about lines, angles and two-dimensional shapes by completing several review questions. You will then work on a Challenge Activity related to the activities you have been working on in Section 1.

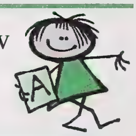
Part 1: Reviewing the Concepts

For Part 1 you will complete all of the review questions for Day 6 in Assignment Booklet 8A. First, you may wish to look back through the Student Module Booklet to review the concepts covered in Section 1.

Part 2: Challenge Activities

The Challenge Activities in Part 2 are designed to extend the ideas you have been learning about and encourage you to explore new ideas. In Assignment Booklet 8A you will find two Challenge Activities. Choose **either** Activity A **or** Activity B (**or** you may do both if you wish).

Turn to Day 6 in Assignment Booklet 8A, and complete all of the review questions in Part 1. Then do one or both of the Challenge Activities in Part 2.



Assessing What You Know (I)

This is the last day you will be working on Section 1: Discovering Geometry. You are to complete **two** activities in Assignment Booklet 8A:

- Showing What You Can Do
- Basic Number Facts

Read the explanation of the activities in Parts 1 and 2 before turning to Assignment Booklet 8A. Note that you will need the help of your home instructor for both activities.

Part 1: Showing What You Can Do

For this activity you will need the help of your home instructor. You will be working on a short activity while your home instructor observes you. As you work through the problem, try to explain clearly what you are doing.

Your home instructor may ask you questions like the following:

- "How do you know that?"
- "Why did you decide to do that?"
- "How did you get that answer?"

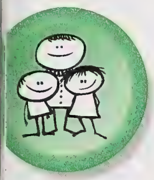
Your job is to explain what you are doing so that your home instructor can understand your thinking.

Note to the Home Instructor

This performance assessment should take about 20 minutes. The Home Instructor's Assessment Page and accompanying Student's Assessment Page can be found in Day 17 of Assignment Booklet 8A. Remove both pages from the Assignment Booklet. Read over the student's page so you are familiar with the student's assigned task. You should also preview the interview questions and the checklist before the student begins working on the assigned task.

As the student works to answer the questions, encourage him or her to talk about what he or she is doing. **Allow the student to use any manipulatives or cut-out learning aids available to help solve the problem**. You may or may not wish to use some of the interview questions. Look for understanding and the student's ability to explain clearly what he or she is doing to arrive at an answer. Indicate on the checklist whether you feel the student demonstrated the skills being assessed.

Attach both assessment pages to the Assignment Booklet before sending it in for marking.



Part 2: Basic Number Facts

In this activity you will show how well you are learning the basic number facts for addition and multiplication. Ask your home instructor to time as you do each test.

When your home instructor is ready, turn to Assignment Booklet 8A, and complete the activities found in Parts 1 and 2 of Day 7.

This is the end of Section 1: Discovering Geometry. Check over Assignment Booklet 8A to make sure you have completed all of the assigned activities for each day. Remember that for Day 6 you need to complete the review questions in Part 1 and one or both Challenge Activities in Part 2.

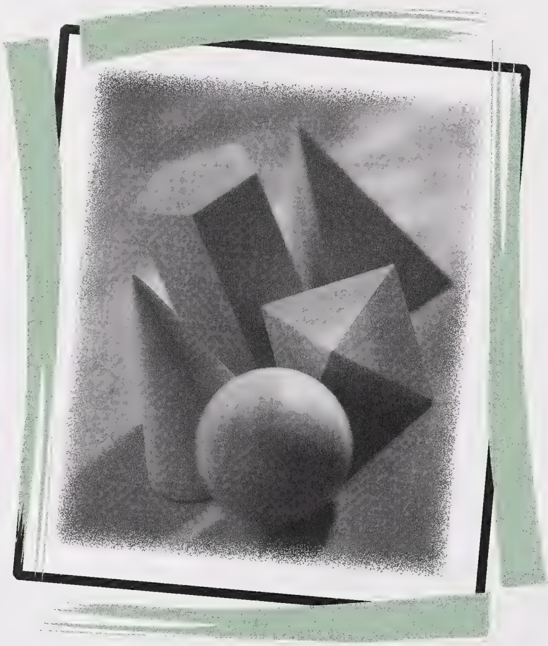
Be sure to attach the **two** assessment pages from Day 7 to Assignment Booklet 8A. Then send Assignment Booklet 8A to your teacher.

Section 2
Exploring 3-D Objects

Looking at 3-D Objects

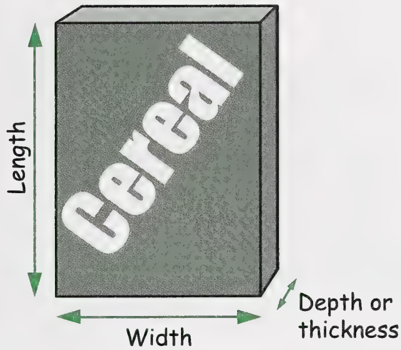
In Section 1 you discovered that lines, angles, and 2-D figures are all around you. You also learned that artists, carpenters, and designers use 2-D figures in many ways.

Three-dimensional (3-D) objects are also a very important part of your world.

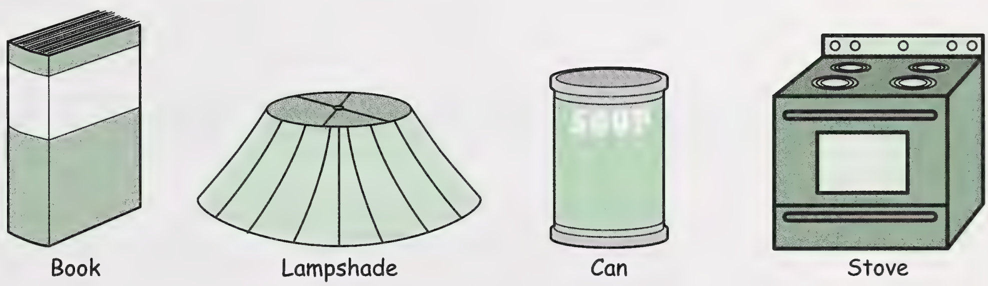


Three-dimensional objects have length, width, and thickness (or depth).

For example, a box of cereal is a 3-D object. You can measure its length, its width, and its depth (or how thick it is).



Other examples of 3-D objects include the following:



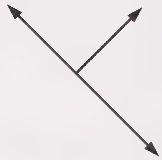
These objects all have length, width, and thickness (or depth).

1. Look around your home and out the window. Write the names of **four** 3-D objects that you see.

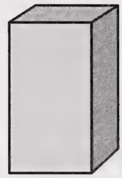
- ______________________________
- ______________________________
- ______________________________
- ______________________________

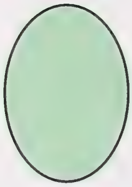
Check your answers in the Appendix.

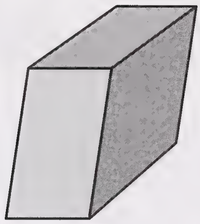
2. Which of these drawings show 3-D objects? Circle the letter beside the drawings that you think are 3-D.

a. 

b. 

c. 

d. 

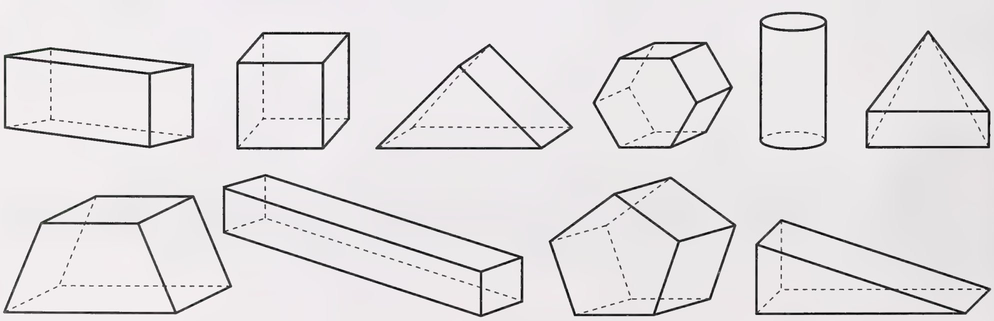
e. 

f. 

Check your answers in the Appendix.

With your home instructor or a friend, search around your home for cardboard or plastic objects that have three dimensions. Build a collection of at least **eight** 3-D objects. These can be objects from the recycling bin or things that you use every day. For example, you might include small packing cartons, empty food boxes, shoeboxes, wood scraps, candy containers, tubes, toys, books, or game boxes. Make sure that none of the objects is too large to place on your desk!

Try to gather objects that are shaped like the ones shown below.



Sorting and Classifying 3-D Objects

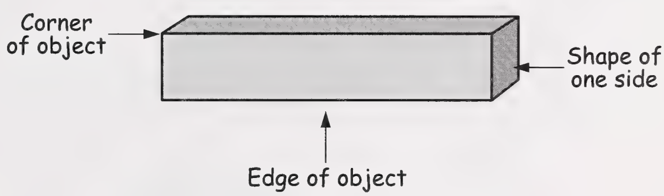
Ask your home instructor to help you with this activity.

Note to the Home Instructor

Observe your child as he or she works through these sorting tasks. Ensure that your child is clear about what to do for each task and that each object has been grouped properly. You can monitor this task to make sure the student notices different characteristics of 3-D objects. The words *edges*, *corners*, and *sides* will be used again in the lesson as the student learns the correct mathematical names for these terms. The answers for this activity are not included in the Appendix because each student will have a unique collection to sort.

Take a careful look at your collection of 3-D objects. Pay close attention to the following features of your objects:

- shapes of the flat surfaces
- corners
- overall size
- edges



You will sort your objects in three different ways.

Sort all the objects into **two** groups:

- objects with straight edges
- objects with curved edges

Is one group larger than the other? ___________

Which one? ___________________________________

Now sort all the objects into two groups again!

- objects with flat surfaces that are all quadrilaterals
- objects with some flat surfaces that are not quadrilaterals

Is one group larger than the other group? __________

Which one? ______________________________

Use all your objects to sort one more time! Sort the objects into two groups:

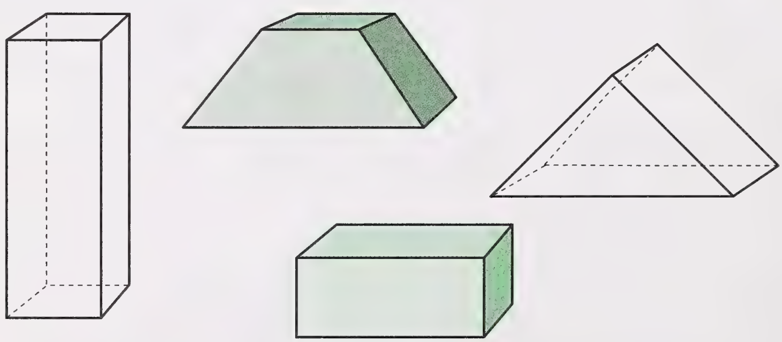
- objects that have eight corners
- objects that do not have eight corners

Is one group larger than the other group? __________

Which one? ______________________________

Now that you have sorted your collection in different ways, you will have noticed that many 3-D objects are similar.

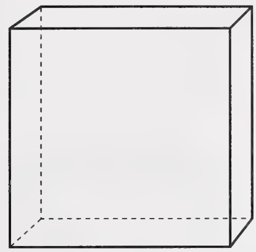
- Many have straight edges.
- Many have flat surfaces that are quadrilaterals.
- Many have eight corners.



You may also have noticed that the flat surfaces of many 3-D objects are 2-D shapes like triangles, rectangles, or squares.

Each flat surface of a 3-D object is called a face.

A **face** is one surface of an object. The object below has two square faces. Can you find them?

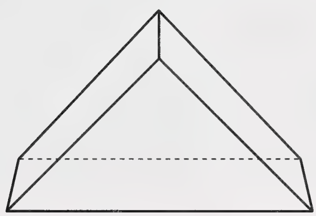


It also has rectangular faces.

3. **a.** How many faces does the object have? ____________

b. How many faces are rectangular? ____________

This object has two triangular faces. Can you find them?



It also has other faces.

4. **a.** How many faces does it have in all? ____________

b. What shapes are the faces?

____

Check your answers in the Appendix.

Faces, Edges, and Vertices

Now, with the help of your home instructor, carefully examine four of your 3-D objects. Look for the faces on each object. Use the chart to tell what shape the faces are and how many faces each object has.

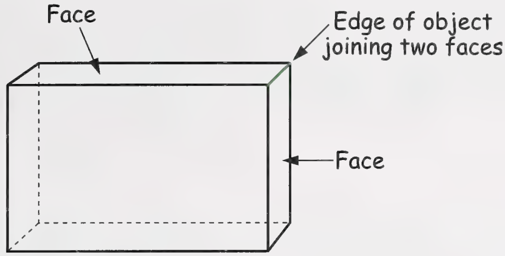
Note to the Home Instructor

Help your child as he or she works through this task. Ensure that each object is carefully observed and that the student is clear about how to count all flat surfaces or faces of the object. No answers are included in the Appendix as each student will have different objects and faces to record on the chart.

Use this chart to note your observations of **four** objects you collected. Draw the shape of each face that you discover. One example has been done for you.

Object	Shape of Faces	Number of Faces with Each Shape	Total Number of Faces
Tissue box	rectangle square	4 2	6

The edges of 3-D objects are the lines where the faces of an object join.



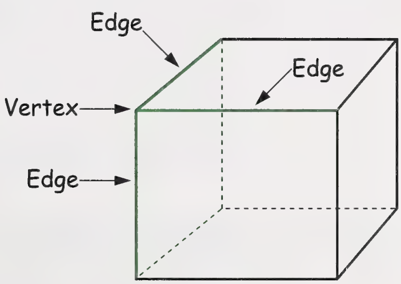
5. In the 3-D figure above, how many edges are there? __________

If you are having difficulty with this question, look at one of your 3-D objects that is similar to the one in the picture. Count the number of edges on your object.

Check your answer in the Appendix.

Each corner of a 3-D object is called a **vertex.**

In Section 1 you learned that a vertex is the point where two lines or rays meet or intersect. In the case of 3-D objects, the vertex is the point where three or more edges meet. Three-dimensional objects have several **vertices**.



Look at your collection of 3-D objects one more time. Choose **three** objects with straight edges.

Find the edges, vertices, and faces of each object. Record the numbers of edges, vertices, and faces in the chart.

Object	Number of Vertices	Number of Edges	Number of Faces

Now compare the three objects.

6. What do you notice about the number of faces and the number of vertices? Are there more faces or more vertices?

____

7. Are there more edges or faces?

____

Check your answers in the Appendix.

Problem Solving

Reviewing the Making a List Strategy

Making an organized list is a strategy you will use when a problem involves figuring out all the possible combinations.

> You have four new CDs to listen to, but you can't decide what order to play them in. How many possible combinations are there?

Write the names of four of your favourite CDs.

A.

B.

C.

D.

Step 1: Understand the problem.

You need to organize the CDs in all the possible combinations.

Step 2: Make a plan. (Choose a strategy.)

You will need to make a list of all the combinations. Use the Making a List strategy.

Step 3: Try the plan.

Start your list. Begin with all the combinations where Disc A is played first. The first three combinations are done for you.

A B C D
A B D C
A C B D

8. a. How many different combinations did you find? ___________

b.

ANSWER TO THE PROBLEM

Check your answers in the Appendix.

Step 4: Look back.

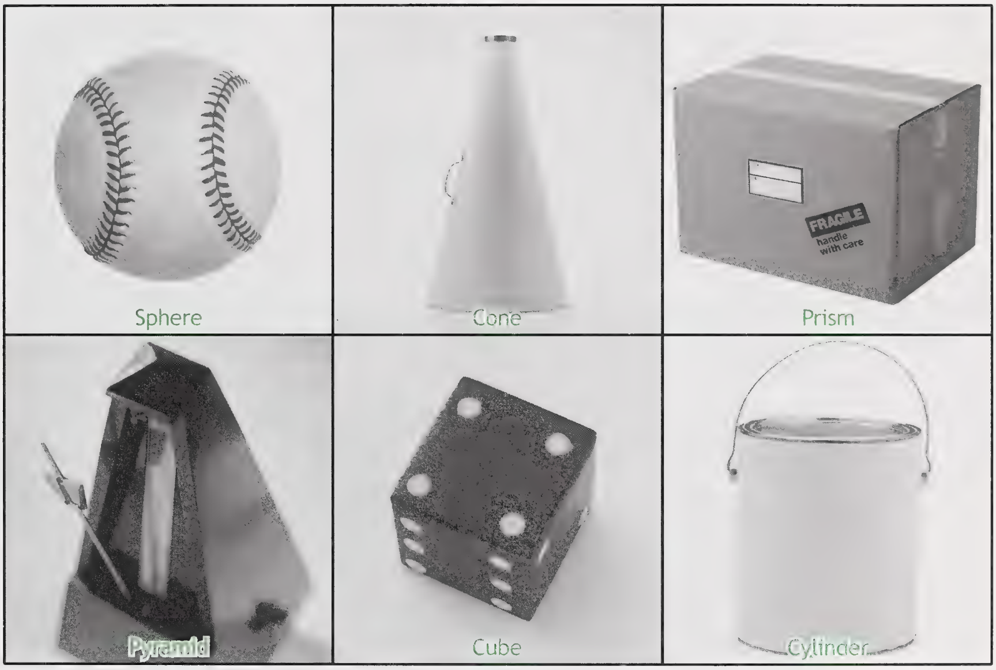
Did you answer the question being asked in the problem? What method did you use to make sure you didn't miss any combinations? Could you use this method to solve another problem?

Turn to Assignment Booklet 8B, and complete the activities for Day 8.

Geometric Solids and Nets

Three-dimensional objects can also be called geometric solids. Geometric solids or 3-D solids are objects that have length, width, and thickness or depth.

You may have been introduced to the names of geometric solids in earlier grades. Do you remember learning about the solids shown below?



Sphere Cone Prism
Pyramid Cube Cylinder

Can you think of other real-life examples of each of the geometric solids?

1. a. sphere: ______________________________

b. cube: ______________________________

c. cylinder: ______________________________

d. prism: ______________________________

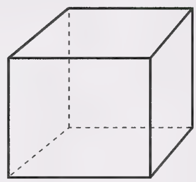
e. cone: ______________________________

f. pyramid: ______________________________

Check your answers in the Appendix.

Cubes

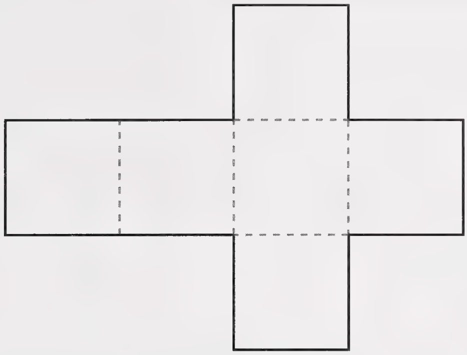
You are probably familiar with the **cube**. A cube is a solid with six square faces, eight vertices, and 12 edges.



Some common cubes found in real life are sugar cubes, ice cubes, and children's building blocks.

If you were to open up a cube by cutting along some of its edges, you would be able to flatten the 3-D cube into a 2-D figure.

The flattened cube would have six square faces joined together in a simple arrangement. It would look something like this.

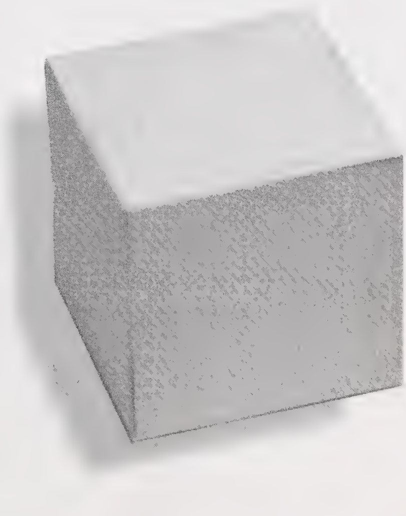


This pattern is called a net.

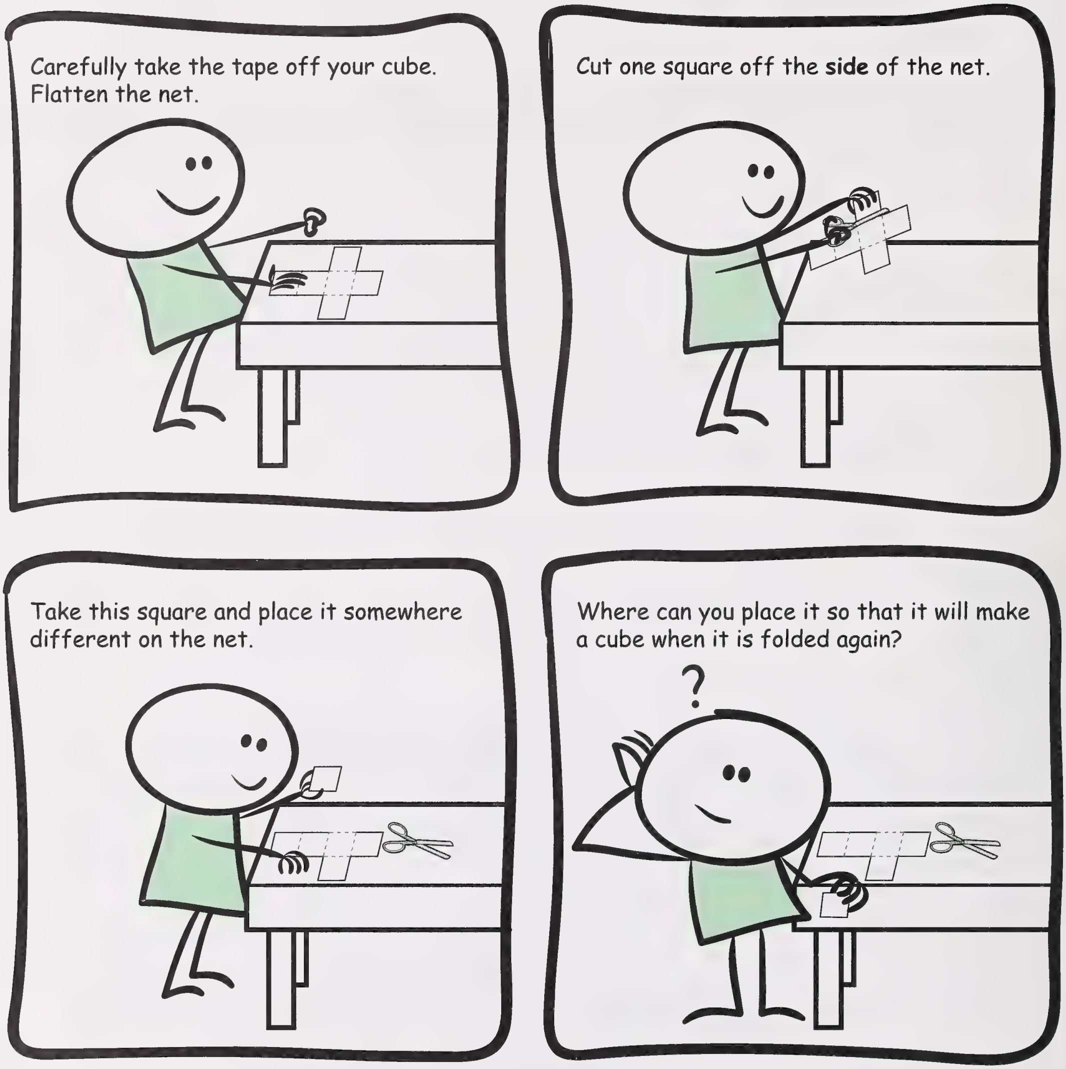
You will be working with many different nets in this module.

Look in the Cut-Out Learning Aids section of the Appendix for Day 9. Find the Cube Net. Follow the directions below to make a cube. Ask your home instructor to help if you need to.

- Cut out the net along its outside edges.
- Fold it on the lines to make a cube.
- Tape the edges with small bits of tape to hold the cube together.



Can you make a different net but still fold it into a cube?



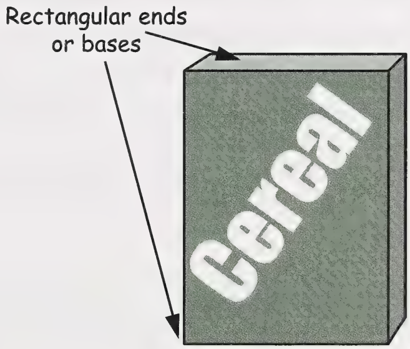
Try putting the square in different places. When you have a new net that will fold into a cube, do the question on the next page.

2. Make a sketch of your new net.

Check your answer in the Appendix.

Rectangular Prisms

In Day 8, you gathered a collection of 3-D objects. Find an object in your collection that is shaped like a cereal box. It should have six faces that are rectangular. You may remember that this solid is called a prism.



Hold the box by the top and bottom ends. The ends are sometimes called **bases**. The two bases of a prism are special faces because the name of the prism comes from the shape of the bases.

The bases on the box are shaped like rectangles, so this solid is called a **rectangular prism**.

Look at the bases of the rectangular prism. Notice that the bases are parallel to each other.

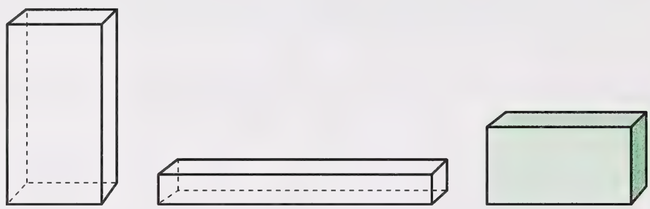
3. What other faces are parallel to each other?

____

____

Check your answer in the Appendix.

More examples of rectangular prisms are shown below.



4. Rectangular prisms are commonly found in your home and neighbourhood. Look around your home and out the window. List **three** rectangular prisms that you see.

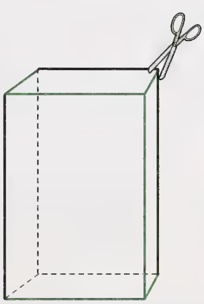
- ____________________________________
- ____________________________________
- ____________________________________

Check your answers in the Appendix.

Many buildings are shaped like rectangular prisms.

Now you are going to create a net from a rectangular prism. Find the empty cereal box or rectangular prism that you used earlier. Tape the flaps on the ends (bases) together so that there are no open sides. Check with your instructor to be sure you are allowed to cut the box apart.

Cut along the sides of the box as shown to make a net.



5. Draw a sketch of the cardboard net that you made from the box.

Check your answer in the Appendix.

The cardboard net that you sketched is not the only way to construct a net for a rectangular prism.

You will find a net for a rectangular prism in the Cut-Out Learning Aids section of the Appendix. Look for Day 9: Rectangular Prism Net. When you find the net, follow these directions:

- Cut the net on the outer lines.
- Fold it to form a rectangular prism. **Do not** tape it closed.
- Notice where the bases are located.

Do you think it is possible to move the base and still be able to make a prism? Try it by following these directions:

- Cut off **one** of the bases.
- Tape it along another edge of the net.
- Will it form a rectangular prism when you fold it?
- Keep trying until you get a net that works.

6. Sketch your new net for the rectangular prism in the space below.

Check your answers in the Appendix.

Mental Math

The Zero Drop

Sometimes numbers end with zeros in the ones, tens, hundreds, or thousands places. For example, these groups of numbers end in zeros.

20	200	3000
40	500	4000

If both numbers in an operation end in the same number of zeros, there is a quick way to add or subtract these numbers mentally. Drop the zeros and perform the operation as if the zeros weren't there. Then put the zeros back in your final answer.

Example

$20 + 40 =$

If you drop the zeros, $20 + 40$ can be thought of as $2 + 4$. You know that $2 + 4 = 6$. Therefore, $20 + 40 = 60$. The answer contains one zero, just like the original numbers.

Example

$600 + 800 =$

7. Try these questions on your own. Drop the zeros and add quickly in your head. Don't forget to put the zeros back in the answer.

   a. $70 + 90 =$

   b. $500 + 400 =$

   c. $300 + 200 + 500 =$

   d. $2000 + 4000 =$

   e. $6000 + 1000 + 3000 =$

Check your answers in the Appendix.

Subtraction problems can also be done quickly in your head by dropping the zeros.

Example

$90 - 30 =$

Drop the zeros.

Think: $9 - 3 = 6$

Therefore: $90 - 30 = 60$

8. Try these questions. Drop the zeros and then put them back in the answer.

a. $700 - 200 =$

b. $4000 - 1000 =$

c. $900 - 400 =$

d. $6000 - 3000 =$

Check your answers in the Appendix.

Basic Number Facts Practice

Ask your home instructor to time you as you complete the following exercises. Your goal is to complete all 25 questions in each exercise in 2 minutes. At the end of 2 minutes, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 2 minutes. Mark these questions using the answer key as well.

Basic Number Facts Practice

Addition Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Subtraction Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Record your score on the Number Facts Progress Chart.

9. Addition Number Facts
Timed Exercise: 2 minutes

$\begin{array}{r} 9 \\ +\ 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ +\ 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ +\ 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ +\ 6 \\ \hline \end{array}$
$3 + 9 =$	$7 + 5 =$	$4 + 9 =$	$8 + 6 =$	$5 + 8 =$
$\begin{array}{r} 6 \\ +\ 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ +\ 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ +\ 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ +\ 8 \\ \hline \end{array}$
$8 + 7 =$	$5 + 7 =$	$6 + 9 =$	$7 + 7 =$	$9 + 3 =$
$\begin{array}{r} 4 \\ +\ 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ +\ 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ +\ 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ +\ 9 \\ \hline \end{array}$

Check your answers in the Appendix.

STOP

10. Subtraction Number Facts
Timed Exercise: 2 minutes

$\begin{array}{r}15\\-\ 6\\\hline\end{array}$	$\begin{array}{r}13\\-\ 4\\\hline\end{array}$	$\begin{array}{r}18\\-\ 9\\\hline\end{array}$	$\begin{array}{r}16\\-\ 7\\\hline\end{array}$	$\begin{array}{r}11\\-\ 8\\\hline\end{array}$
$13-8=$	$14-7=$	$12-4=$	$11-4=$	$15-7=$
$\begin{array}{r}16\\-\ 8\\\hline\end{array}$	$\begin{array}{r}14\\-\ 8\\\hline\end{array}$	$\begin{array}{r}13\\-\ 5\\\hline\end{array}$	$\begin{array}{r}17\\-\ 9\\\hline\end{array}$	$\begin{array}{r}15\\-\ 8\\\hline\end{array}$
$12-7=$	$17-8=$	$14-9=$	$11-2=$	$16-9=$
$\begin{array}{r}14\\-\ 6\\\hline\end{array}$	$\begin{array}{r}13\\-\ 6\\\hline\end{array}$	$\begin{array}{r}15\\-\ 9\\\hline\end{array}$	$\begin{array}{r}12\\-\ 3\\\hline\end{array}$	$\begin{array}{r}14\\-\ 5\\\hline\end{array}$

Check your answers in the Appendix.

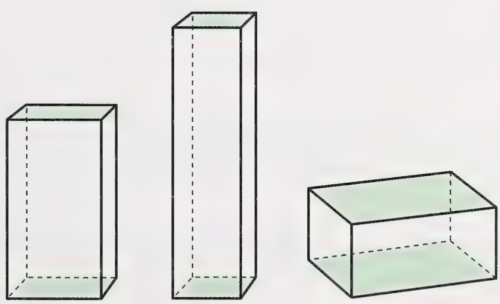
Turn to Assignment Booklet 8B, and complete the activities for Day 9.

Prisms of All Sorts

The most common kind of prism is the **rectangular prism**.

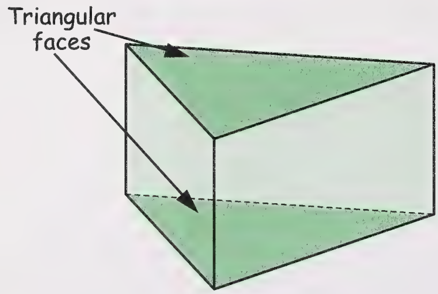
Can you see some rectangular prisms in the picture?

In Day 9 you discovered that a rectangular prism is a geometric solid with rectangular faces.



In Day 8 you gathered a collection of 3-D objects. You may have noticed that some objects have two opposite faces that are the same but that are not rectangles.

A **triangular prism** has two triangular faces. These two faces are sometimes called bases.



1. Look at the triangular prism above.

   a. How many triangular faces are there? ____________

   b. How many rectangular faces are there? ____________

   c. How many faces are there altogether? ____________

2. Look around you and out the window. Can you find **three** examples of triangular prisms?

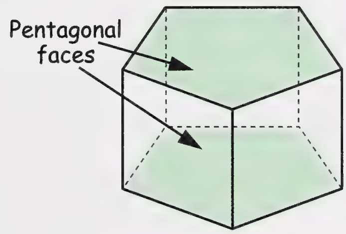
   - ____
   - ____
   - ____

Check your answers in the Appendix.

You may already have a triangular prism in your collection of 3-D objects. A Toblerone chocolate bar and its box are examples of a triangular prism.

Find Day 10: Triangular Prism Net in the Cut-Out Learning Aids section of the Appendix. Cut out the net. You may colour it if you wish. Tape the net together and add the triangular prism to your collection of geometric solids.

A pentagonal prism has two faces that are pentagons. The other faces are rectangular.



3. Look at the pentagonal prism above.

a. How many pentagonal faces are there? ___________

b. How many rectangular faces are there? ___________

c. How many faces are there in all? ___________

4. Which has more total faces: the rectangular prism, the triangular prism, or the pentagonal prism?

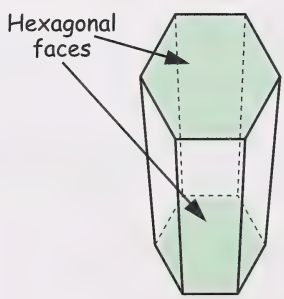
____

Check your answers in the Appendix.

The greenhouses in the photograph are shaped like pentagonal prisms.

Now you will make your own pentagonal prism. Turn to the Cut-Out Learning Aids section of the Appendix. Find Day 10: Pentagonal Prism Net. Cut it out, colour it if you like, and tape it together. Add the prism to your collection of geometric solids.

A prism with two hexagonal faces is called a **hexagonal prism**.



Like all of the other prisms you have studied, the other faces are shaped like rectangles.

5. a. How many rectangular faces does a hexagonal prism have? ________

b. How many faces are there in all? ________

Check your answers in the Appendix.

Hexagonal prisms are not as common as rectangular prisms. Can you think of an object that is this shape?

Make a hexagonal prism from the Day 10: Hexagonal Prism Net found in the Cut-Out Learning Aids section of the Appendix. Place it in your collection of solids.

6. **a.** Could a prism have eight rectangular faces? ___________

b. What would it be called? ________________________________

c. What shape would the bases be? ________________________________

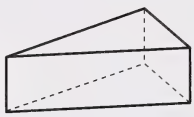
Check your answers in the Appendix.

Summing Up

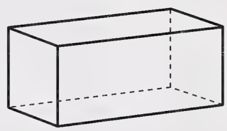
All **prisms** have two parallel bases that are the same shape and several rectangular faces.

A prism is named for the shape of its base.

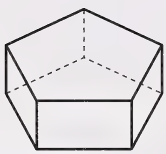
The number of rectangular faces equals the number of sides on the base.



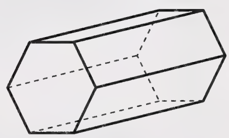
Triangular prism



Rectangular prism



Pentagonal prism



Hexagonal prism

Problem Solving

Reviewing the Making a Table Strategy

Lucky you! You have won a Loonie Giveaway Contest! You will be given a loonie on the first day of the month. This free money doubles in value every day so that on the second day of the month, you will get 2 loonies. On the third day, you will get 4 loonies. On the fourth day, you will get 8 loonies, and so on. How much money will you have in all at the end of 10 days?

Step 1: Understand the problem.

There is a lot of data to calculate in this problem. You need to find the total number of dollars given to you if the amount doubles each day for 10 days.

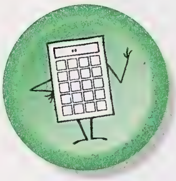
Step 2: Make a plan. (Choose a strategy.)

One way to solve a problem like this is to use a table or chart.

Step 3: Try the plan.

Set up a table with the words **Day** and **Loonies**. Fill in the table with the information you know.

Day	1	2	3	4	5	6	7	8	9	10
Loonies	1	2	4	8						



Use your calculator to find the **total** number of dollars that were won in the Loonie Giveaway. This means you will have to add all the loonies that were won each day.

7. a. What is your total? __________

b. ANSWER TO THE PROBLEM

Check your answers in the Appendix.

Step 4: Look Back

Read the problem again to make sure you have answered the question. Check your calculations again. Does your answer make sense?

Just For Fun

How much money would you get after 12 and 15 days if the Loonie Giveaway Contest continued?

8. Extend your chart from question 7 to find out how much you would get on the 12th and 15th days of the contest.

a. How much money would you get on the 12th day? ____________

b. How much money would you get on the 15th day? ____________

9. What would you buy with your loonies?

____

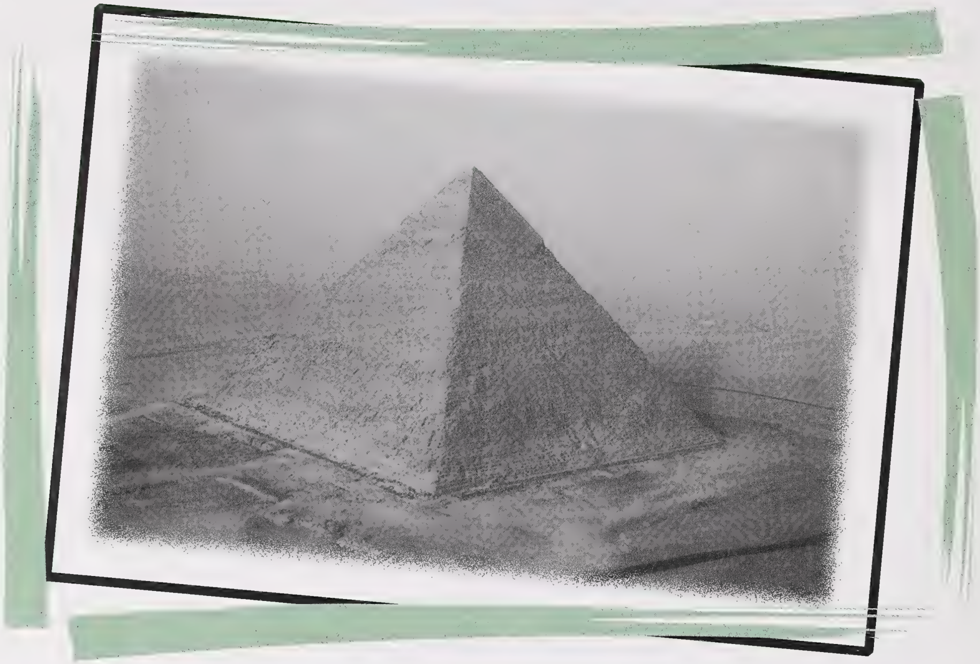
10. Were you surprised by the amount after 15 days? ____________

Check your answers in the Appendix.

Turn to Assignment Booklet 8B, and complete the activities for Day 10.

Day 11

Looking at Pyramids



Some of the most well-known structures in the world are the pyramids in Egypt. Other ancient cultures, such as the Mayans, also built pyramids.

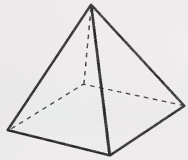
Look closely at the picture of the pyramid. What do you notice about it? It has four triangular faces that meet at the top in a point.

In Day 10 you learned that prisms are named for their bases. Pyramids are also named for the shape of their bases.

The pyramids in Egypt have square bases. They are called **square-based pyramids**.

The four triangular faces of the pyramid shown above meet at the top in a point or **vertex**.

1. How many sides does the base of this pyramid have? __________



2. a. How many triangular faces does a square-based pyramid have?

____

b. How many faces does a square-based pyramid have in total?

____

Follow the directions on page 207 of the textbook to make a model of a solid. Add it to your collection of geometric solids.

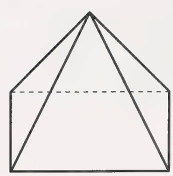
3. What is the name of this geometric solid? ______________________

4. The pyramid shape is sometimes found in buildings. Look around your neighbourhood or in magazines for buildings that contain the shape of a square-based pyramid. What type of building has this shape?

____

Check your answers in the Appendix.

Another type of pyramid has a base that is shaped like a rectangle. It is called a **rectangular-based pyramid**.



5. a. What is the total number of faces in a rectangular-based pyramid?

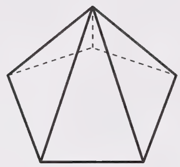
____

b. How many triangular faces does this pyramid have? __________

Outline the base of this pyramid with a red pencil crayon or marker.

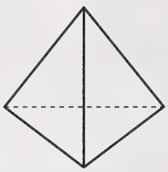
Check your answers in the Appendix.

A pyramid with a base that is shaped like a pentagon is called a **pentagonal-based pyramid**. The base has five sides, so the pyramid has five triangular faces. Including the pentagonal face, it has six faces in total.



Outline the base of this pyramid with a blue pencil crayon or marker.

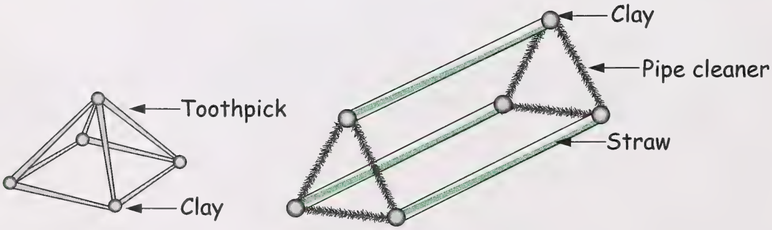
6. What do you think the pyramid to the right is called? ______________________________



Check your answers in the Appendix.

More Models

Use toothpicks and small lumps of modelling clay to make models of geometric solids. Join the toothpicks using clay at each corner and vertex. Small lengths of pipe cleaners or straws may be used instead of toothpicks.



Square-based pyramid

Triangular prism

Practise making the following models:

- square-based pyramid
- pentagonal-based pyramid
- triangular-based pyramid
- rectangular prism
- triangular prism

Mental Math

The Zero Drop

In Day 9 you learned how to add or subtract two numbers with the same number of zeros at the end.

What happens when the numbers you are adding or subtracting end in an unequal number of zeros?

Example

$4000 + 300 =$

There are three zeros in 4000.
There are two zeros in 300.

You must drop an equal number of zeros from each number. Drop two zeros.

Think: $4000 + 300 =$

$40 \quad + 3 \quad = 43$

Two zeros have been dropped from each number. Now you have to put two zeros back in your answer.

$4000 + 300 = 4300$

7. Try the following questions in your head. Remember to drop an equal number of zeros from both numbers. Then put those zeros back in your answer.

a. $600 + 20 =$ ☐ b. $3000 + 700 =$ ☐ c. $9000 + 400 =$ ☐

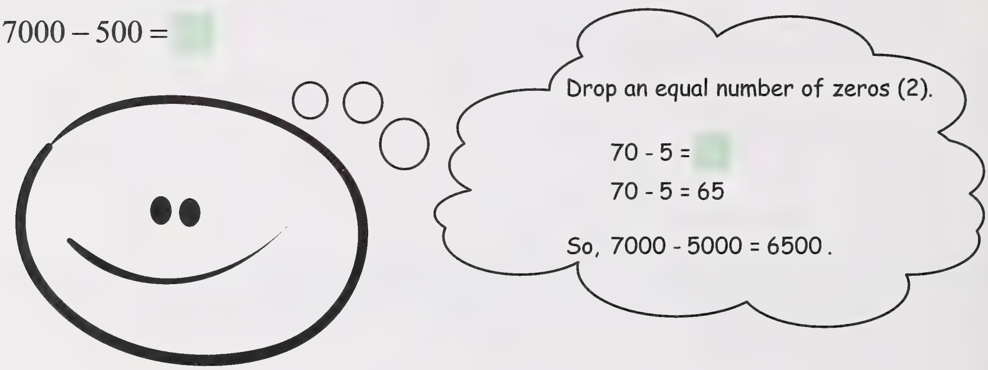
d. $500 + 30 + 20 =$ ☐ e. $2000 + 100 + 700 =$ ☐

Check your answers in the Appendix.

Subtraction problems involving numbers with unequal zeros can also be done in your head if you use the zero drop method.

Example

$7000 - 500 =$ ☐



8. Solve these questions in your head.

a. $1000 - 400 =$ ☐ b. $7000 - 200 =$ ☐

c. $800 - 50 =$ ☐ d. $6000 - 800 =$ ☐

e. $1200 - 200 - 300 =$ ☐

Check your answers in the Appendix.

Basic Number Facts Practice

Ask your home instructor to time you as you complete the following exercises. Your goal is to complete all 25 questions in each exercise in 2 minutes. At the end of 2 minutes, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 2 minutes. Mark these questions using the answer key as well.

Basic Number Facts Practice

Multiplication Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Division Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Record your score on the Number Facts Progress Chart.

9. Multiplication Number Facts
Timed Exercise: 2 minutes

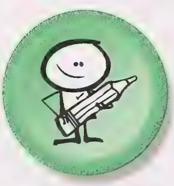
$3 \times 5 =$ $\quad$ $6 \times 8 =$ $\quad$ $5 \times 9 =$ $\quad$ $7 \times 7 =$ $\quad$ $4 \times 8 =$

$$\begin{array}{r} 6 \\ \times\ 5 \\ \hline \end{array} \qquad \begin{array}{r} 9 \\ \times\ 9 \\ \hline \end{array} \qquad \begin{array}{r} 4 \\ \times\ 6 \\ \hline \end{array} \qquad \begin{array}{r} 7 \\ \times\ 5 \\ \hline \end{array} \qquad \begin{array}{r} 8 \\ \times\ 3 \\ \hline \end{array}$$

$5 \times 5 =$ $\quad$ $6 \times 9 =$ $\quad$ $3 \times 9 =$ $\quad$ $7 \times 8 =$ $\quad$ $5 \times 8 =$

$$\begin{array}{r} 4 \\ \times\ 9 \\ \hline \end{array} \qquad \begin{array}{r} 9 \\ \times\ 5 \\ \hline \end{array} \qquad \begin{array}{r} 8 \\ \times\ 9 \\ \hline \end{array} \qquad \begin{array}{r} 7 \\ \times\ 6 \\ \hline \end{array} \qquad \begin{array}{r} 8 \\ \times\ 5 \\ \hline \end{array}$$

$8 \times 4 =$ $\quad$ $5 \times 7 =$ $\quad$ $6 \times 6 =$ $\quad$ $2 \times 9 =$ $\quad$ $7 \times 3 =$



Check your answers in the Appendix.

STOP

10. Division Number Facts
Timed Exercise: 2 minutes

$9\overline{)81}$	$5\overline{)45}$	$8\overline{)24}$	$6\overline{)30}$	$7\overline{)63}$
$56 \div 7 =$	$32 \div 8 =$	$72 \div 9 =$	$25 \div 5 =$	$40 \div 8 =$
$8\overline{)64}$	$7\overline{)49}$	$7\overline{)21}$	$4\overline{)28}$	$6\overline{)54}$
$72 \div 8 =$	$42 \div 7 =$	$36 \div 6 =$	$24 \div 4 =$	$18 \div 9 =$
$9\overline{)45}$	$5\overline{)30}$	$3\overline{)27}$	$4\overline{)32}$	$8\overline{)56}$

Check your answers in the Appendix.

Turn to Assignment Booklet 8B, and complete the activities for Day 11.

Making Nets for Pyramids

You have already learned several things about pyramids.

- Pyramids have one base.
- The triangular faces of a pyramid meet at a vertex.
- The number of triangular faces is equal to the number of sides on the base.

In today's lesson you will make models of pyramids by changing nets. You will find that there is more than one net or pattern that can be used to make a model pyramid.

Find Day 12: Square-Based Pyramid Net in the Cut-Out Learning Aids section of the Appendix.

Cut out the net. Fold it, but **do not** tape it together yet.

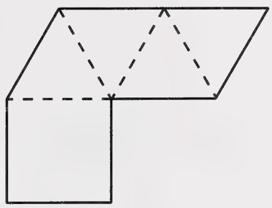
Cut off one of the triangular faces and tape it along another triangular section of the net.

1. Sketch at least two different nets for the square-based pyramid.

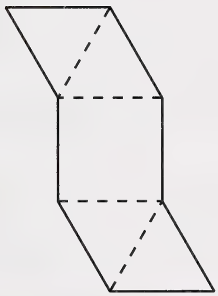
Check your answers in the Appendix.

2. Look at the following nets. Which one would **not** make a square-based pyramid? Circle it.

a.



b.



Check your answers in the Appendix.

Tape the net for the square-based pyramid together. Add it to your collection of geometric solids.

Find Day 12: Rectangular-Based Pyramid Net in the Cut-Out Learning Aids section of the Appendix.

Cut it out and fold it, but do not tape it yet.

Notice the five sections that make up this net:

- one rectangular base
- four triangular faces with two different shaped triangles

3. Cut off one triangle. Try placing the triangle in different places on the net. Find **two** more ways to make a net for a rectangular pyramid.

Sketch the new nets below.

Check your answers in the Appendix.

Tape your net together and add it to your collection of solids.

Find Day 12: Pentagonal-Based Pyramid Net in the Cut-Out Learning Aids section of the Appendix.

The net for the pentagonal pyramid has the following:

- six sections
- one pentagonal base
- five triangular faces

4. Cut off one of the triangles. Try placing it in other positions to make a net that will form a pentagonal pyramid. Find **two** new nets.

   Sketch the new nets in the space below.

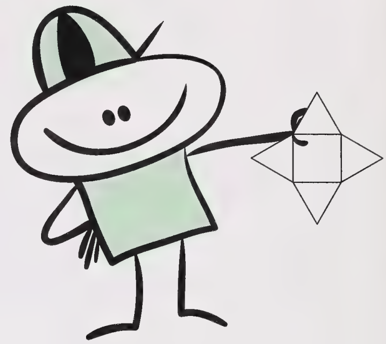
Check your answers in the Appendix.

Tape the net together and add it to your collection.

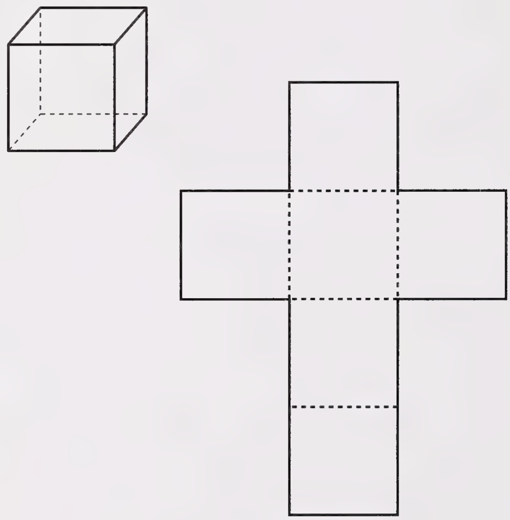
Summing Up

When you look at the net for any geometric solid, think about these points:

- How many sections does the net have? The sections will form the faces of a solid.
- What shapes are the faces?
- What sizes are the faces?

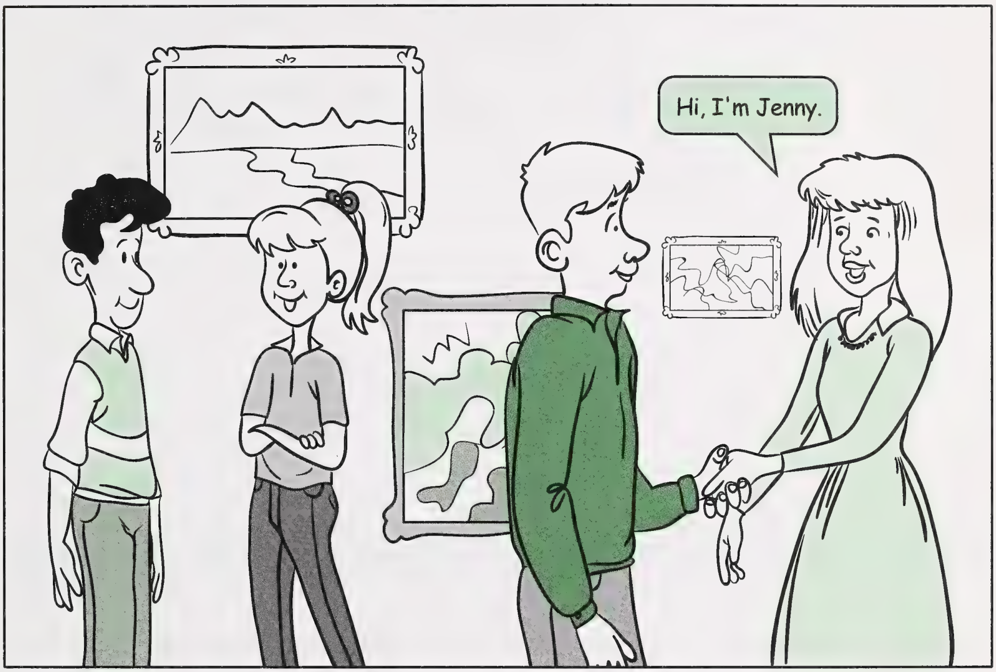


For example, the net for a cube has six sections. Each section or face is a **square**. Each square is the same size.



Problem-Solving Strategy: Acting It Out

Sometimes the best way to solve a problem is to act it out. You may need to use real objects or create drawings to help you use this strategy.



Jenny went to an art workshop, where she met three other artists. The artists introduced themselves. Each person shook hands with all the other artists. How many handshakes were there in all?

Step 1: Understand the problem.

There are four artists shaking hands. They shake each other's hands only once to introduce themselves. How many handshakes would there be in all?

Step 2: Make a plan. (Choose a strategy.)

Try acting this problem out with friends or family members and count the number of handshakes. If four family members are not available, you could use four stuffed toys, or dolls, or other objects to represent the artists.

Step 3: Try the plan.

Ask four people to pretend to introduce themselves to each other by shaking hands. You may want to ask three people to line up and a fourth person to shake hands while you count. Then that person can stand aside because they have met everyone. Repeat the process with the other three people until everyone has shaken hands with each person.

5. a. How many handshakes did you count? __________

b.

ANSWER TO THE PROBLEM

Check your answers in the Appendix.

Step 4: Look back.

Does your answer make sense? Was there a better way to solve this problem?

Turn to Assignment Booklet 8B, and complete the activities for Day 12.

Comparing Prisms and Pyramids

In Day 10 you learned some important facts about prisms:

- Prisms have two bases or ends that are the same shape.
- Three or more faces are shaped like rectangles.
- Prisms are named for the shape of their bases.
- Nets can be made to construct models of prisms.
- There are many possible nets for each model.

What have you learned about pyramids?

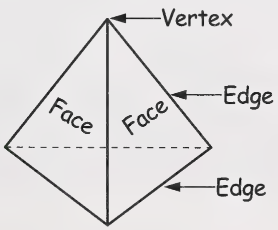
1. Write three facts you have learned about pyramids.

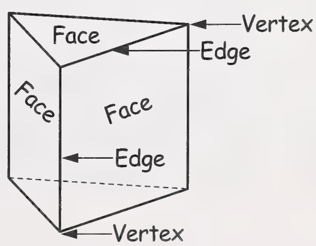
- ______________________________
- ______________________________
- ______________________________

Check your answers in the Appendix.

One way to compare prisms and pyramids is to think about how many **faces**, **edges**, and **vertices** each solid has.

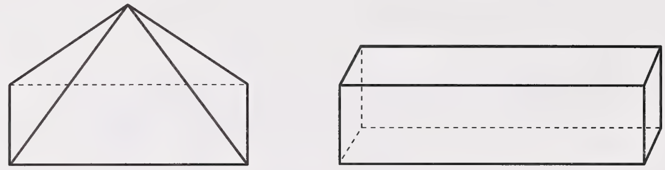
Remember that faces are the flat surfaces of a solid. Edges are the lines where the faces of a solid join. A vertex is the point where three or more edges meet.





You can also look for **parallel faces**, **parallel lines**, **right angle corners**, or **intersecting lines**.

2. Compare these two solids by filling in the chart. You may refer to your own models of these solids if you wish.



	Rectangular Pyramid	Rectangular Prism
Number of Faces		
Number of Edges		
Number of Vertices		
Shapes of Faces		
Any Right Angles?		
Any Parallel Lines?		

Check your answers in the Appendix.

Prisms and pyramids come in different shapes and sizes. Gather the models of all your prisms and pyramids. Look at them carefully. How are prisms and pyramids alike? How are they different?

3. Turn to page 206 of your textbook. Write the answers in the chart below.

Pyramids	Prisms

Check your answers in the Appendix.

Taking Another Look

The following activity is optional. You may choose to do it or not. You **should** complete the activity if you had difficulty with the questions in Day 13 or if you feel you need more practice with pyramids and prisms.

If you choose **not** to do the questions at this time, you may wish to return here later to review addition before completing the review activities for Day 14.

Matching Game

If you are having trouble remembering the names of the pyramids and prisms you have learned about, you may want to practice by playing a matching game.

Take out all of the models of geometric solids that you have found or made. Find all the prisms and pyramids.

Make up labels with the names of all the pyramids and prisms you have learned about. Look back through Days 10 to 13 if you need to.

Try to match each label with the correct model by laying the label beside the model. (Don't tape the labels on.) Ask your home instructor to check the labels. Mix the labels up and try again if you need more practice.

Basic Number Facts Practice

Ask your home instructor to time you as you complete the following exercises. Your goal is to complete all 25 questions in each exercise in 2 minutes. At the end of 2 minutes, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 2 minutes. Mark these questions using the answer key as well.

Basic Number Facts Practice

Addition Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Subtraction Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Record your score on the Number Facts Progress Chart.

4. Addition Number Facts
Timed Exercise: 2 minutes

$\begin{array}{r} 9 \\ +\ 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ +\ 8 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ +\ 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ +\ 6 \\ \hline \end{array}$
$9 + 3 =$	$7 + 4 =$	$8 + 5 =$	$6 + 7 =$	$9 + 5 =$
$\begin{array}{r} 3 \\ +\ 8 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ +\ 9 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ +\ 7 \\ \hline \end{array}$
$6 + 6 =$	$4 + 9 =$	$7 + 5 =$	$2 + 9 =$	$6 + 8 =$
$\begin{array}{r} 8 \\ +\ 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ +\ 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ +\ 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ +\ 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ +\ 9 \\ \hline \end{array}$

Check your answers in the Appendix.

STOP

5. Subtraction Number Facts
Timed Exercise: 2 minutes

$18 - 9 =$	$16 - 8 =$	$13 - 5 =$	$15 - 7 =$	$12 - 3 =$
$\begin{array}{r} 14 \\ -\ 8 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ -\ 9 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ -\ 8 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ -\ 7 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ -\ 6 \\ \hline \end{array}$
$11 - 9 =$	$14 - 7 =$	$16 - 7 =$	$12 - 4 =$	$11 - 8 =$
$\begin{array}{r} 13 \\ -\ 6 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ -\ 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ -\ 7 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ -\ 6 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ -\ 5 \\ \hline \end{array}$
$15 - 9 =$	$12 - 6 =$	$13 - 7 =$	$11 - 6 =$	$14 - 9 =$

Check your answers in the Appendix.

Turn to Assignment Booklet 8B, and complete the activities for Day 13.

Putting It All Together (II)

In Section 2 you discovered several new things about geometric solids:

- You learned that 3-D objects have length, width, and depth.
- You sorted and classified solids based on the number of faces, edges, and vertices they have.
- You learned to make nets for many geometric solids:
  - cubes and rectangular prisms
  - other prisms (triangular, pentagonal, hexagonal)
  - several pyramids (square-based, rectangular-based, pentagonal-based)
- You compared prisms to pyramids.

Knowing how to describe geometric solids and how to construct models from nets are skills you will use again as you study more about geometry in later grades.

Today you will show what you have learned about geometric solids by completing several review questions. You will then work on a Challenge Activity related to the activities you have been working on in Section 2.

Part 1: Reviewing the Concepts

For Part 1 you will complete all of the review questions for Day 14 in Assignment Booklet 8B. First, you may wish to look back through the Student Module Booklet to review the concepts covered in Section 2.

Part 2: Challenge Activities

The Challenge Activities in Part 2 are designed to extend the ideas you have been learning and encourage you to explore new ideas about 3-D geometric shapes. In Assignment Booklet 8B you will find two Challenge Activities. Choose **either** Activity A **or** Activity B (**or** you may do both if you wish).

Turn to Assignment Booklet 8B, and complete all of the review questions in Part 1. Then do one or both of the Challenge Activities in Part 2.

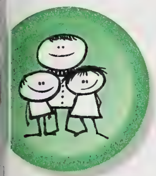
Assessing What You Know (II)

This is the last day you will be working on Section 2: Exploring 3-D Objects. You are to complete **two** activities in Assignment Booklet 8B:

- Showing What You Can Do
- Basic Number Facts

Read the explanation of the activities for both Parts 1 and 2 before turning to Assignment Booklet 8B. Note that you will need the help of your home instructor for both activities.

Part 1: Showing What You Can Do



For this activity you will need the help of your home instructor. You will be working on a short activity while your home instructor observes you. As you work through the problem, try to explain clearly what you are doing.

Your home instructor may ask you questions like the following:

- "How do you know that?"
- "Why did you decide to do that?"
- "How did you get that answer?"

Note to the Home Instructor

This performance assessment should take about 15 minutes. The Home Instructor's Assessment Page and accompanying Student's Assessment Page can be found in Day 15 of Assignment Booklet 8B. Remove both pages from the Assignment Booklet. Read over the student's page so you are familiar with the student's assigned task. You should also preview the interview questions and the checklist before the student begins working on the assigned task.

As the student works to answer the questions, encourage him or her to talk about what he or she is doing. **Allow the student to use any manipulatives or cut-out learning aids available to help solve the problem.** You may or may not wish to use some of the interview questions. Look for understanding and the student's ability to explain clearly what he or she is doing to arrive at an answer. Indicate on the checklist whether you feel the student demonstrated the skills being assessed.

The student may refer to the collection of solids but please make sure that they have not been labelled with the geometric names.

In question 3, the student may use scrap paper to sketch and cut out samples of the nets before drawing them on the assessment page.

Attach both assessment pages to the Assignment Booklet before sending it in for marking.

Part 2: Basic Number Facts

In this activity you will show how well you are learning the basic number facts for subtraction and division. Ask your home instructor to time you as you do each test.

When your home instructor is ready, turn to Assignment Booklet 8B, and complete the activities found in Parts 1 and 2 of Day 15.

This is the end of Section 2: Exploring 3-D Objects. Check over Assignment Booklet 8B to make sure you have completed all of the assigned activities for each day. Remember that for Day 14 you need to complete the review questions in Part 1 and one or both Challenge Activities in Part 2.

Be sure to attach the **two** assessment pages from Day 15 to Assignment Booklet 8B. Then send Assignment Booklet 8B to your teacher.

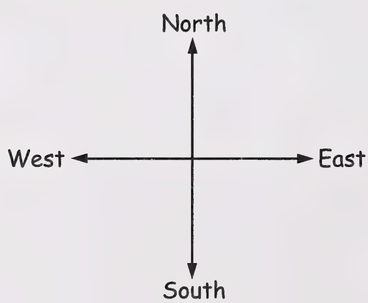
Section 3
Finding Your Way

Using Directions

Have you ever had to ask someone for directions to a certain place?

Today you will learn more about using directions and locating places on maps and grids. You will start by practising giving and following directions.

You are probably familiar with the four main directions.



Review the directions with your home instructor.

Start by getting your home instructor to point north. Turn your body so that you are facing north. Then hold out your right arm. Your right arm is pointing to the east.

Now hold out your left arm. Your left arm is pointing west.

Your back is towards the south.

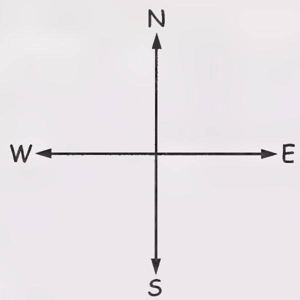
Note to the Home Instructor

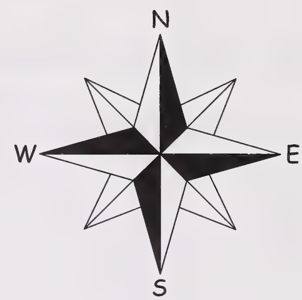
This section of the module reviews and teaches concepts related to specific locations on two-dimensional grids and maps and will give the student practice using the directions north, south, east, and west. The student should be very comfortable using these directions.

If your student has trouble responding to specific directions, provide extra practice in the form of short oral drills. These drills can be included throughout the student's daily routine. For example, you could say, "Look at your desk. Your pencil is east of your book. Which direction from your book is your eraser?" Carry out these short exercises several times a day until the student is very familiar with the directions.

You should have a map of the province that shows grid lines to help locate specific places. Other maps of cities or countries might also prove helpful to reinforce the concepts learned in this section.

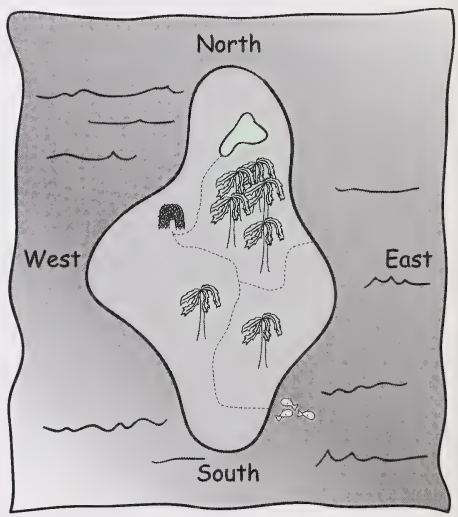
On paper, directions are shown by a set of arrows or a compass symbol. The directions may be abbreviated with letters as shown below.



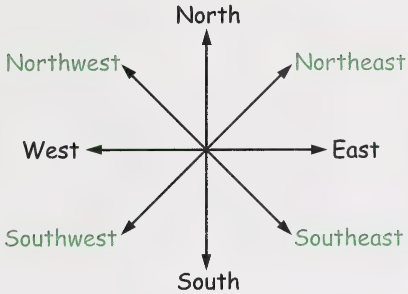


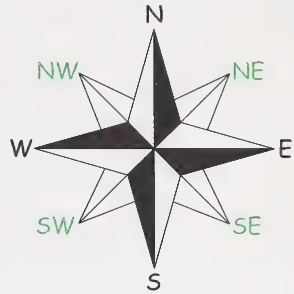
When you draw or read a map, you need to know these things:

- The top of the map represents **north**.
- The bottom of the map is **south**.
- The right side is **east**.
- The left side is **west**.



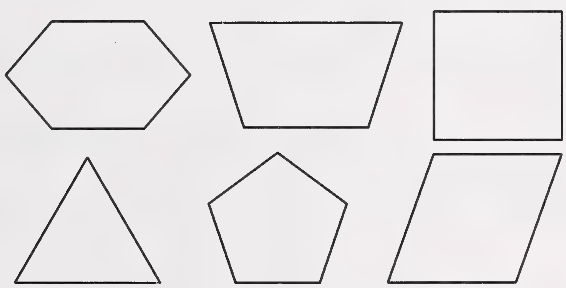
You will also need to know the other directions that are found between the four main directions.





Practise using these directions often to be sure that you understand them.

1. Answer the following questions about this drawing. Use words like **north**, **northwest**, **northeast**, **west**, **east**, **south**, **southwest**, and **southeast**.



a. The triangle is ______________________________ of the trapezoid.

b. The parallelogram is ______________________________ of the trapezoid.

c. The hexagon is ______________________________ of the pentagon.

d. The square is ______________________________ of the pentagon.

Check your answers in the Appendix.

Do this activity with your home instructor. Go on a mini-field trip in your house or your yard. Have your home instructor read you the following directions:

- Face **north**.
- Turn and walk **five steps** to the **west**.
- Turn and walk **three steps** to the **south**.
- Turn and walk **four steps** to the **east**.
- Turn and walk **three steps** to the **north**.
- Turn and walk **one step** to the **east**.

2. Where did you finish? ______________________________

Check your answer in the Appendix.

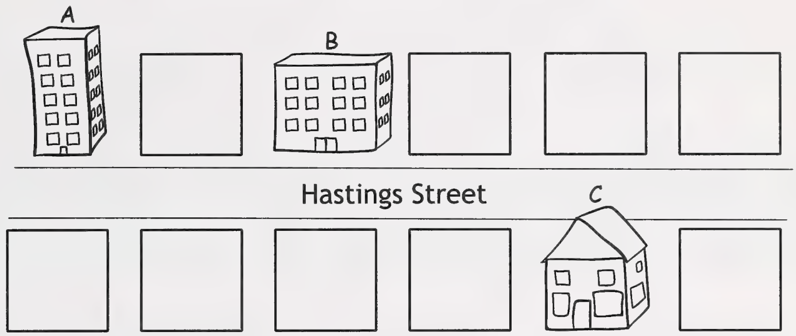
In the space below, write a set of directions like the ones above. Pretend you are walking from your desk to the front door of your home. The first direction is given for you. Try to use other direction words like **northwest** and **southeast**. You may not need all the blanks for your directions.

- **Stand and face north. This is your starting place.**
- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________

Ask your home instructor or another family member to follow your directions. Do they arrive at the front door? If they do, you did a good job of giving directions. If they don't get to the door, make your corrections!

Simple Maps

Practise your map-reading skills by looking at this simple map.



Buildings A, B, and C are all buildings along Hastings Street. Each square on the map stands for one block. Building A is on the north side of Hastings Street.

3. Use direction words to fill in the blanks.

a. Where is Building C? ______________________

b. Building B is located ______________________ of Building A.

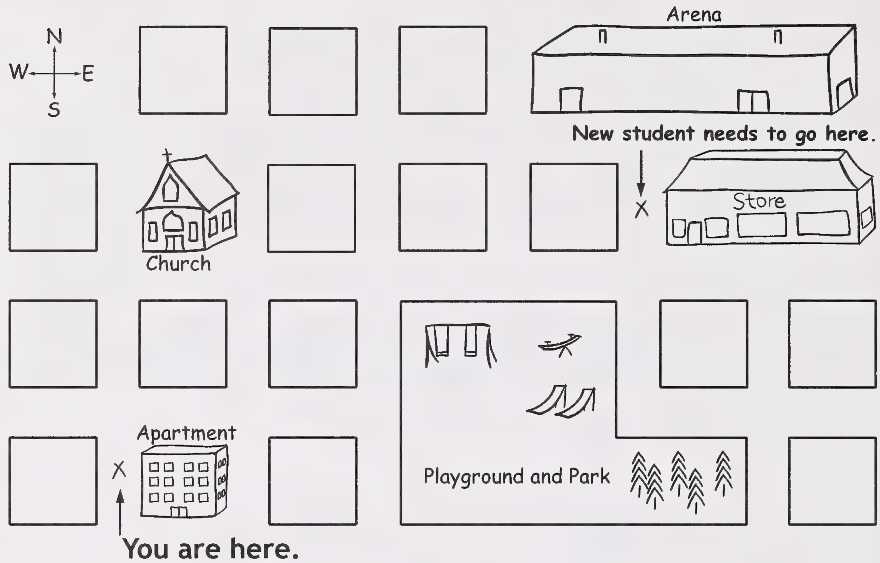
c. Building A is four blocks ______________________ of Building C.

d. Building C is two blocks ______________________ of Building B.

Check your answers in the Appendix.

Has someone ever asked you for directions? It is important to be able to give directions that are easy to understand.

4. Imagine that you are asked to help a new student find the way to the local store to buy school supplies. Use the map to write directions for the student. Use words like **north**, **south**, **east**, and **west**. Refer to landmarks like the church, the playground, or the arena if you like.



The first direction is given. Help the student get to the store by writing down the rest of the directions.

- Walk one block north until you are at the southwest corner of the church.
- ____
- ____
- ____
- ____
- ____

Check your answers in the Appendix.

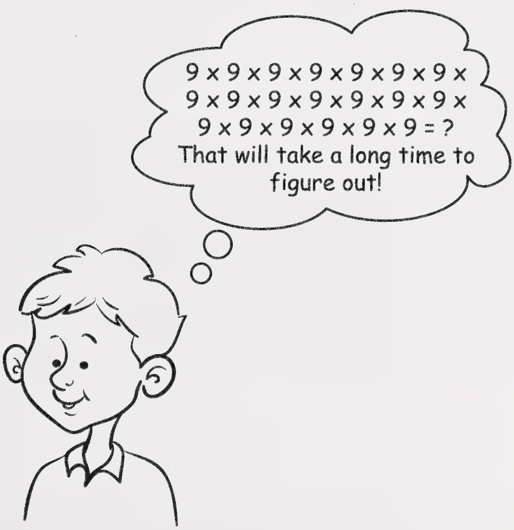
The answer in the Appendix is not the only possible answer. There are many possible ways to give directions to the store. Your first instruction could have been to turn east and walk two blocks to the playground. There are different paths or routes to arrive at the store.

If you have a map, you can plan a route. Usually you are looking for the quickest route or path to a place.

Problem-Solving Strategy: Looking for a Pattern

Sometimes an easy way to solve a problem is to look for a pattern and predict the answer.

Multiply twenty 9s together. What is the ones digit of the final product?



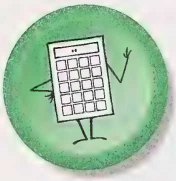
Step 1: Understand the problem.

Multiply 9 by itself 20 times. Look at the final product or answer. What number is in the ones place?

Step 2: Make a plan. (Choose a strategy.)

Multiplying twenty 9s will take a long time. Instead, try the Looking for a Pattern strategy. Try a few calculations and look to see if a pattern forms.

Step 3: Try the plan.



Use a calculator to find the products.

$9 \times 9 =$ ____________

$9 \times 9 \times 9 =$ ____________

$9 \times 9 \times 9 \times 9 =$ ____________

$9 \times 9 \times 9 \times 9 \times 9 =$ ____________

Do you notice any patterns forming?

5. a. When **two** 9s are multiplied, the answer ends in a ____________.

b. When **four** 9s are multiplied, the answer ends in a ____________.

c. Since 2 and 4 are even numbers, tell what you think the pattern will be whenever an even number of nines is multiplied.

____

____

____

Check your answers in the Appendix.

6. a. When three 9s are multiplied, the answer ends in a ____________.

b. When five 9s are multiplied, the answer ends in a ____________.

c. Tell about the pattern that you see when an odd number of nines is multiplied.

____

____

____

Check your answers in the Appendix.

7. Use the information in questions 5 and 6 to predict what the ones digit in the product will be when **twenty** 9s are multiplied together. Give a reason for your answer.

____

____

____

____

8. Now write your answer to the original problem.

ANSWER TO THE PROBLEM

Step 4: Look back.

Does your answer sound reasonable? Does it make sense? Did you check your calculations on the calculator to make sure the answers you wrote are correct?

How could you check to make sure that your prediction about the ones digit for 9 multiplied twenty times is really true?

Check your answers in the Appendix.

Basic Number Facts Practice

Ask your home instructor to time you as you complete the following exercises. Your goal is to complete all 25 questions in each exercise in 2 minutes. At the end of 2 minutes, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 2 minutes. Mark these questions using the answer key as well.

Basic Number Facts Practice

Multiplication Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Division Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Record your score on the Number Facts Progress Chart.

9. Multiplication Number Facts
Timed Exercise: 2 minutes

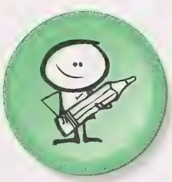
$5 \times 6 =$	$2 \times 9 =$	$8 \times 7 =$	$3 \times 6 =$	$8 \times 4 =$
$\begin{array}{r} 7 \\ \times\ 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ \times\ 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ \times\ 9 \\ \hline \end{array}$
$5 \times 7 =$	$8 \times 9 =$	$3 \times 9 =$	$9 \times 4 =$	$6 \times 6 =$
$\begin{array}{r} 4 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ \times\ 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ \times\ 7 \\ \hline \end{array}$
$3 \times 8 =$	$7 \times 9 =$	$8 \times 5 =$	$6 \times 9 =$	$5 \times 9 =$

Check your answers in the Appendix.

STOP

10. Division Number Facts
Timed Exercise: 2 minutes

$9\overline{)81}$	$8\overline{)72}$	$6\overline{)24}$	$7\overline{)35}$	$9\overline{)63}$
$21 \div 7 =$	$56 \div 7 =$	$45 \div 5 =$	$36 \div 9 =$	$25 \div 5 =$
$9\overline{)72}$	$7\overline{)49}$	$8\overline{)32}$	$3\overline{)27}$	$6\overline{)36}$
$64 \div 8 =$	$54 \div 9 =$	$42 \div 6 =$	$30 \div 6 =$	$48 \div 8 =$
$7\overline{)28}$	$3\overline{)24}$	$8\overline{)56}$	$9\overline{)45}$	$4\overline{)32}$



Check your answers in the Appendix.

Turn to Assignment Booklet 8C, and complete the activities for Day 16.

Learning More About Maps

Maps often show important features such as roads, streets, buildings, rivers, oceans, mountains, parks, lakes, railway tracks, and airports.

Maps usually have printed words to tell the names of things such as towns, cities, streets, and parks.

Many maps have a **legend** or **key** to tell about the special symbols that are used on the map.

Note to the Home Instructor

A map is needed for this activity. It could be a city map or a town map, a map of the province, or a map from an atlas.

1. Take out your map. What features are shown on the map? Write **six** things that your map shows.

    - ____________________________
    - ____________________________
    - ____________________________
    - ____________________________
    - ____________________________
    - ____________________________

2. Can you find a legend or key on the map? Write down **two** symbols that are used on the map. Also tell what the symbols mean.

    - ____
    - ____

Check your answers in the Appendix.

Turn to pages 214 and 215 in your textbook. Look at the map that is shown there.

Notice the legend for this map. It includes symbols that are used on the map. It also gives you a scale to help you determine distances. On the map, 2 cm is equal to 20 m in the town.

You may also notice that this map has a grid of lines that are 2 cm apart. These may be used to tell the distance if you are giving directions.

3. Answer the questions on page 215 of your textbook. Remember to use direction words and include all the possible answers for a question. **Note:** Do not do textbook question 3.b.

Textbook questions 1 to 7

1. Which streets run parallel to Main Street?

____

____

____

2. Which streets intersect at the library?

____

____

____

3. a. Describe a route that would take you from the library to the post office.

____

____

____

____

____

____

____

Do not do question 3.b.

4. In what direction would you be travelling from the hospital to the library? ____________________

From the library to the hospital? ____________________

5. About how far is a route from the library's front door to the intersection of Brown Street and Hill Street?

____

____

6. Which is farther, from Park Street to Valley Drive or from Leisure Lane to Main Street?

____

____

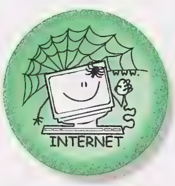
7. Which streets are perpendicular to each other?

____

____

____

Check your answers in the Appendix.



If you would like to learn more about maps, you may want to check out the following website:

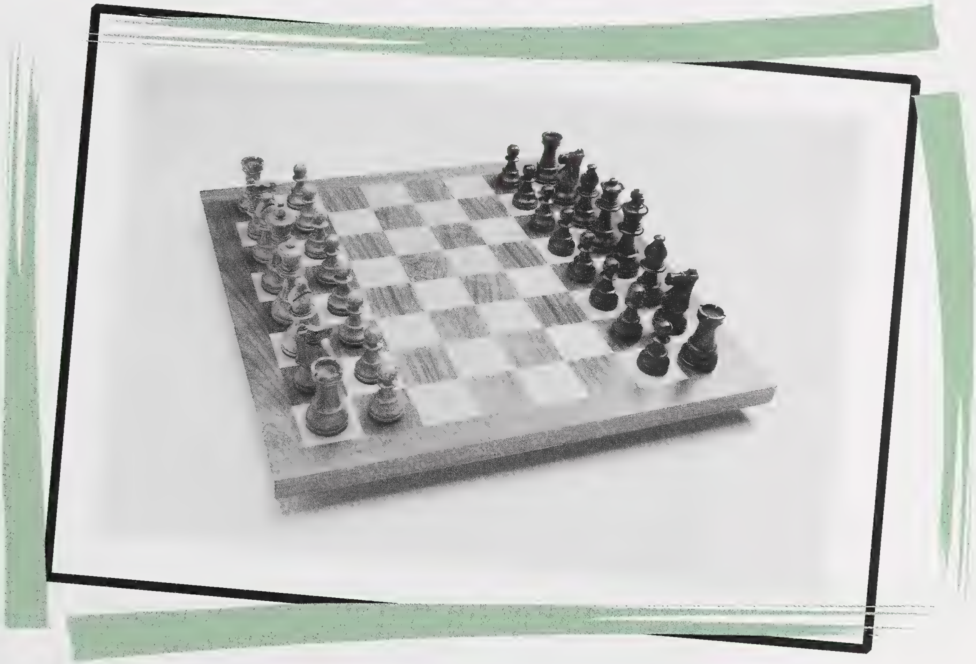
http://www.atlas.gc.ca/english/index.html

There are many types of maps available on the Internet, including satellite photographs.

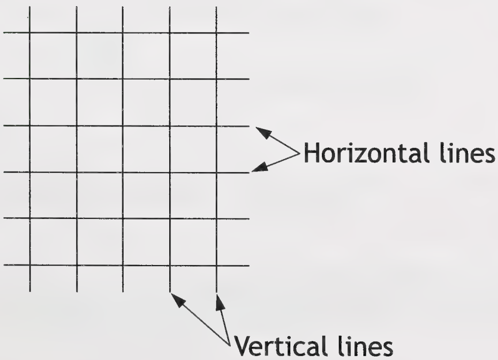
Turn to Assignment Booklet 8C, and complete the activities for Day 17.

Exploring Grids

A **grid** is a set of crossed lines. Many game boards have grids. A chessboard or checkerboard is a grid of squares.



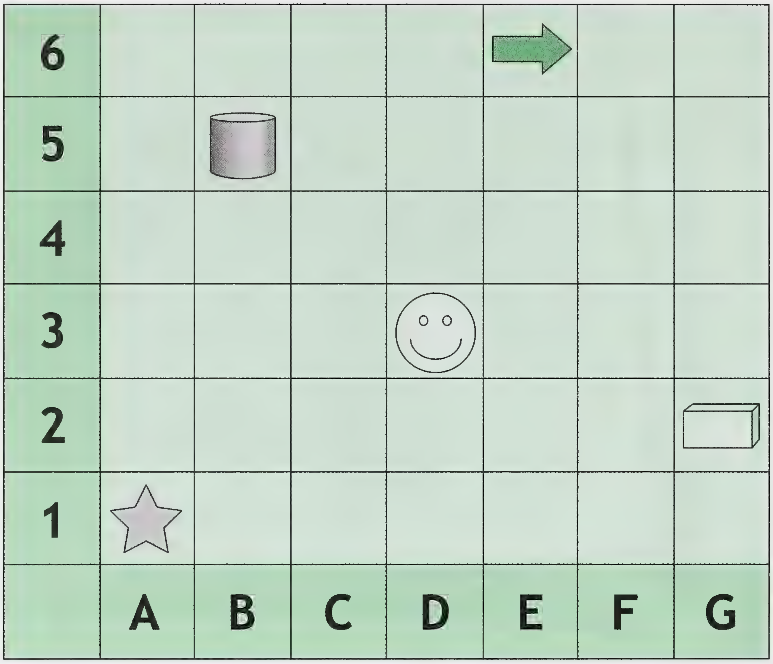
Many maps use grids to help locate certain areas. The map on pages 214 and 215 in your textbook uses a grid to show the scale or distance.



Grids are made up of evenly spaced horizontal and vertical lines. The lines intersect each other to make squares.

The lines on a grid form horizontal **rows** and vertical **columns.**

The following grid has six horizontal rows that are numbered 1 to 6. The grid has seven vertical columns that are lettered A to G.



To find a certain place on the grid, look for the square where the row and column intersect. For example, the happy face is found at the square where **Column D** meets **Row 3**. This square is called **D3**.

An easy way to remember this is to think **Over and Up** .

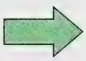
Slide your finger **over** Row 3 and your other finger **up** Column D. The square where your fingers meet is D3.

1. Use the "over and up" method to find the following objects on the grid.

   a. The  is located at the intersection of Column __________ and Row __________.

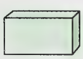
   b. The  is located at the intersection of Column __________ and Row __________.

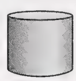
   c. The  is located at the intersection of Column __________ and Row __________.

   d. The  is located at the intersection of Column __________ and Row __________.

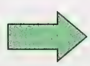
Check your answers in the Appendix.

2. You know that the happy face is found in square **D3** on the grid. Name the location of the following objects in the same way. Write the column letter **first** and the row number **last**.

   a.  __________

   b.  __________

   c.  __________

   d.  __________

Check your answers in the Appendix.

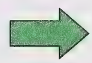
Routes and Paths

You can also describe paths using a grid.

Maps of towns often resemble grids. They usually have the following:

- blocks that are shaped like squares or rectangles
- intersections
- square corners
- streets that run east and west (horizontal lines)
- streets that run north and south (vertical lines)

Grids make it easier to follow a path or route.

3. Use the grid you used for questions 1 and 2 to write instructions for the route you would take to go from the star  to the arrow .

You may give directions by telling how many squares to move and in which direction. Use words like **over**, **up**, **left**, **right**, **east**, **west**, **north**, or **south**.

____

____

____

____

____

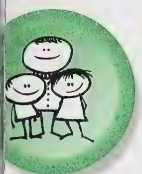
Check your answers in the Appendix.

Grids on Maps

Many maps use grids with columns and rows to help you locate a specific place on the map.

Take out a road map, city or town map, or atlas. Look at the edges of the map. Do you see numbers and letters marked at the edges of the map? This is just like the grid you used in today's activities.

You can use the letters and numbers on the map to locate certain places on the map. Using the "over and up" method, pick a row and a column. Run your fingers **over** the row and **up** the column until they meet. What town, street, or other feature do you see near where your fingers meet?

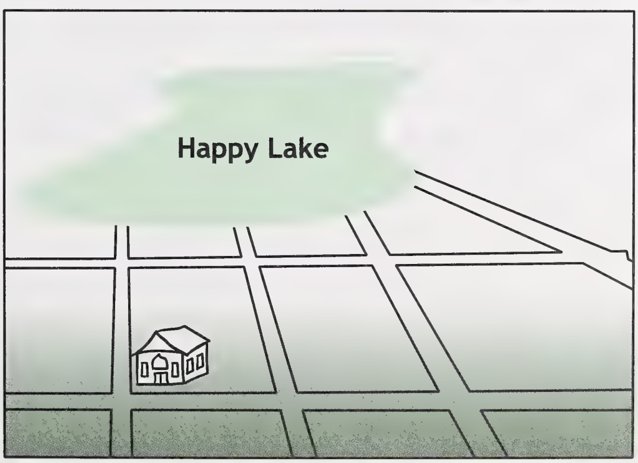


Ask your home instructor to help you locate different places on your map. What columns and rows are these places located in?

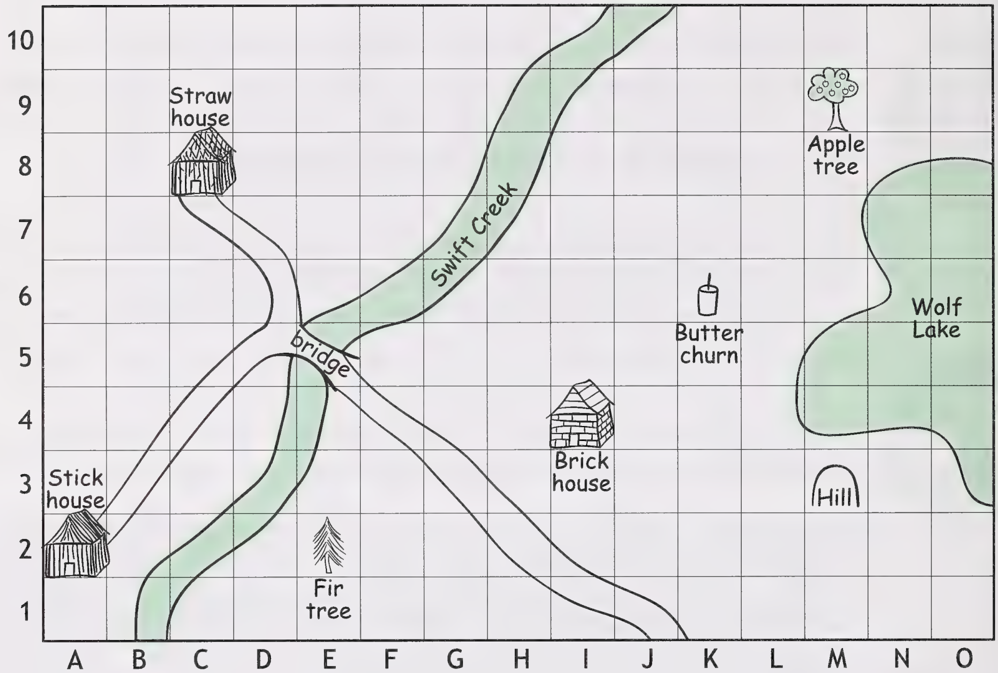
Note to the Home Instructor

Spend a few minutes helping the student locate specific areas on the map. You may want to ask questions like the following:

- What column and row is (your town or city) located in?
- Where is the airport located?
- What lake is located in section D5 of the map?



4. Use the grid to locate the following items on the map. Write the grid location for each item. Write the **column letter first** and the **row number last**. For example, the butter churn is located at **K6**.



a. Straw house: ___________

b. Bridge: ___________

c. Apple tree: ___________

d. Brick house: ___________

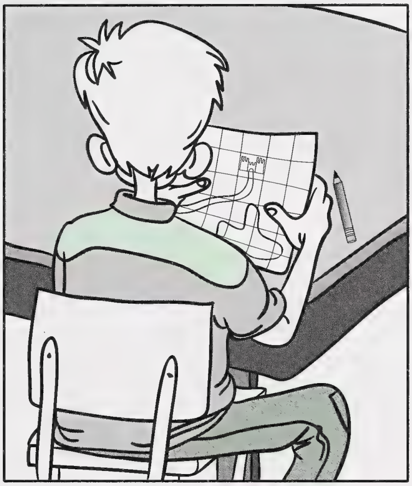
e. Hill: ___________

f. Stick house: ___________

Check your answers in the Appendix.

Just For Fun

If you like working with maps, try drawing your own map on a blank grid.

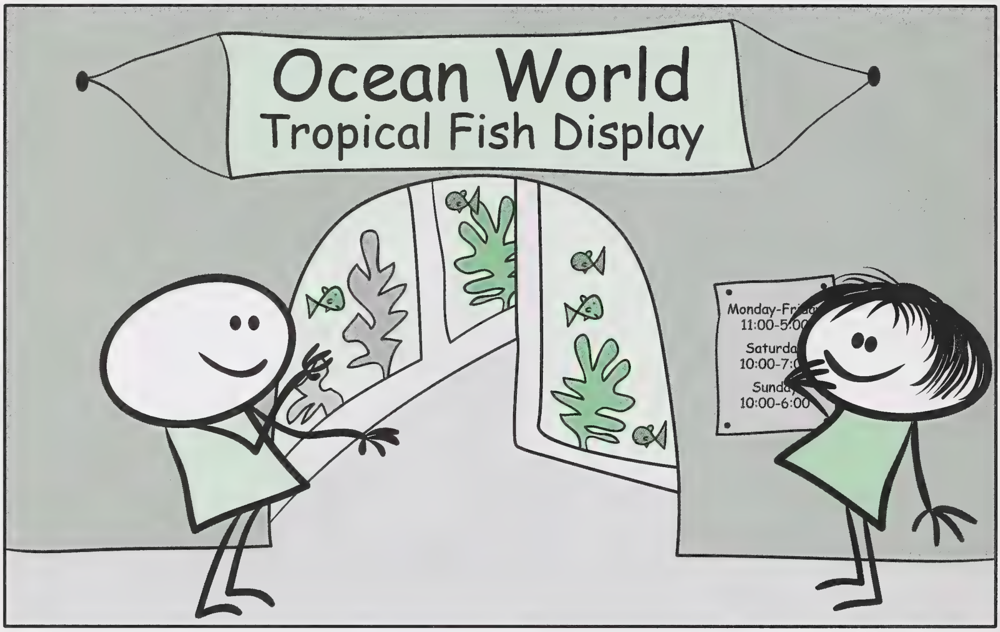


Find Day 18: Grid in the Cut-Out Learning Aids section of the Appendix. Make up a map of a place from a familiar story or from your imagination. For example, you could make a map of Red Riding Hood's journey or a map of an imaginary theme park with amusement rides.

When you are finished your map, ask a friend or family member to tell you the grid locations of certain features on the map.

Problem-Solving Strategy: Drawing a Diagram

Sometimes it is easier to understand a problem if you draw a diagram or picture.



At Ocean World there are three tanks in the tropical fish display. There are 9 fish in Tank A. There are 14 fish altogether in Tanks B and C. Tanks A and B have a total of 15 fish. How many fish are in each tank? What is the total number of fish in the display?

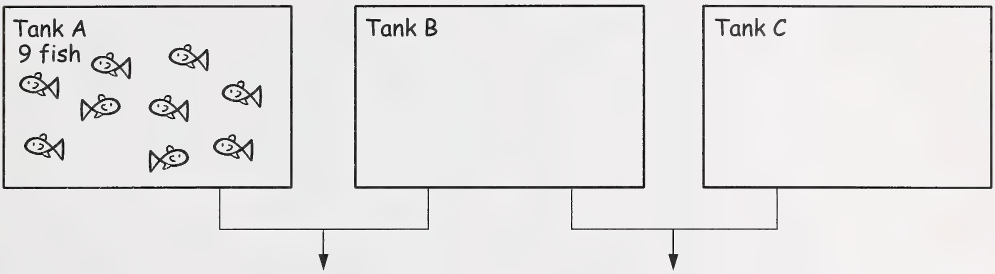
Step 1: Understand the problem.

There are three tanks in the display. Tank A has 9 fish in it. The number of fish in each of the other tanks is not given. However, you know that $\text{Tank A} + \text{Tank B} = 15$ and $\text{Tank B} + \text{Tank C} = 14$. You need to figure out how many fish are in each tank. Then you will have to add the number of fish in each tank to get the total.

Step 2: Make a plan. (Choose a strategy.)

One way to make this problem easier to understand and solve is to draw a picture of the tanks. Use the Drawing a Diagram strategy.

Step 3: Try the plan.



$A+B=15$ $\quad$ $B+C=14$

You know that $\text{Tank A} = 9 \text{ fish}$.
$\text{Tank A} + \text{Tank B} = 15 \text{ fish}$

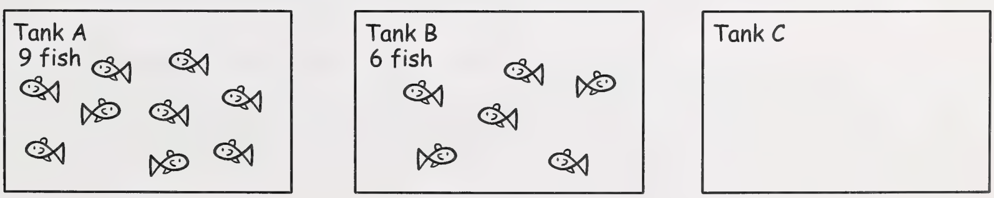
To find out how many fish are in Tank B, make a number sentence.

$9 \text{ fish} + \text{Tank B} = 15 \text{ fish}$

What is the missing number? Find it by subtracting. Turn the sentence around.

$15-9=$ _____ fish in Tank B

$15-9=6$ fish in Tank B



Tank C is easily solved now that you know the other two numbers.

$\text{Tank B} + \text{Tank C} = 14 \text{ fish}$

5. **a.** Use subtraction and addition to finish solving the problem.

b.

ANSWER TO THE PROBLEM
The total number of tropical fish in the display is ________.

Step 4: Look back.

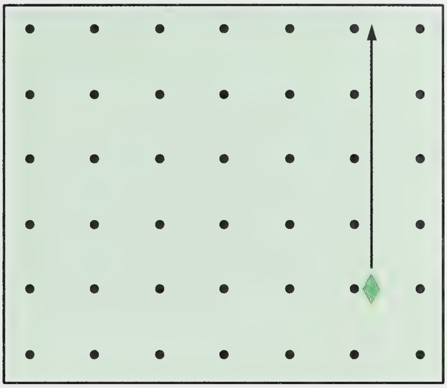
Did you answer the original question? Does your answer seem reasonable? You can check the answers by making sure Tank B + Tank C = 14 and Tank A + Tank B = 15.

Check your answers in the Appendix.

Turn to Assignment Booklet 8C, and complete the activities for Day 18.

More About Grids

In Day 18 you learned that grids are made up of horizontal and vertical lines. Another type of grid can be made from rows of evenly spaced dots. A grid of dots can be used in the same way as a grid of lines.



Start at the diamond. Draw a star that is four dots **north** of the diamond. (This is just like going **up** the column of dots.) Where will the star be?

You should have drawn a small star at the dot near the tip of the vertical arrow.

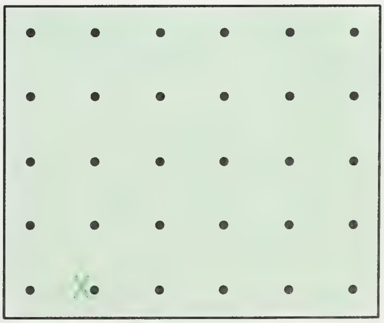
Other locations can be found the same way.

1. Draw an X that is five dots **west** of the star.

Check your answer in the Appendix.

2. a. Make a figure by following the directions. Use a pencil to join the dots—just like a dot-to-dot puzzle.

- Start at the X. Go east four dots.
- Go north three dots.
- Go west four dots.
- Go south three dots.

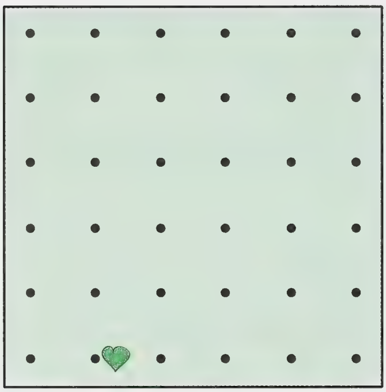


b. What kind of figure did you make? ______________________

Check your answers in the Appendix.

3. a. Follow the instructions. Draw lines to connect the dots as you do each step.

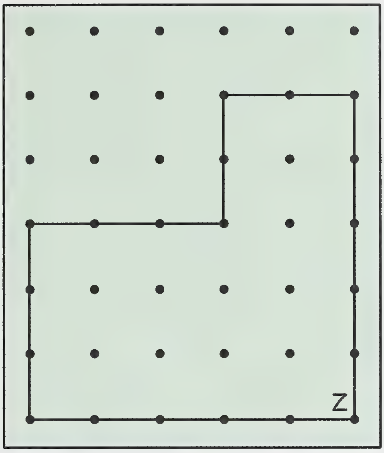
- Start at the heart.
- Go north five dots.
- Go east one dot.
- Go south four dots.
- Go east two dots.
- Go north four dots.
- Go east one dot.
- Go south five dots.
- Go west four dots.



b. What letter was made with the path of dots? __________

Check your answers in the Appendix.

4. Write the directions you would use to make the figure shown below. The first direction is done for you.

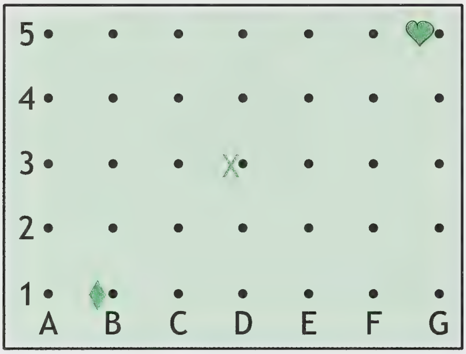


- **Start at the Z.**
- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________

Check your answers in the Appendix.

Locating Objects

The rows and columns on a dot grid can be labelled. In the dot grid below, the **rows** are labelled with numbers. The **columns** are labelled with letters. This looks much the same as the line grids you worked with in Day 18.



The ♥ is at G5.

The X is at D3.

The ♦ is at B1.

Objects on this grid are located in the same way as on line grids. The **X** is located at the intersection of Column D and Row 3. This can also be written as **D3**.

5. Write the location of the objects on this dot grid. The first one has been done for you.

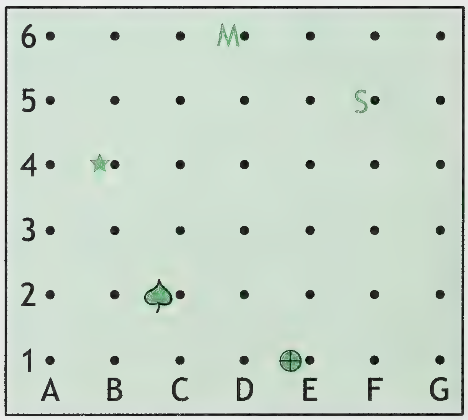
a. ♠ is at **C2**.

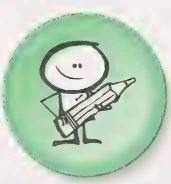
b. M is at ______.

c. ★ is at ______.

d. ⊕ is at ______.

e. S is at ______.





Check your answers in the Appendix.

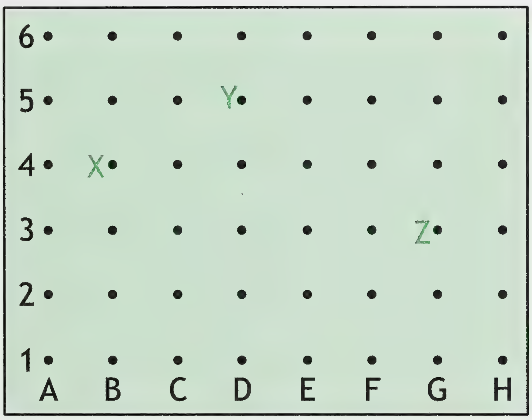
You can describe paths using the row and column location.

Look at the previous dot grid. Two ways you could describe a path from ★ to the **S** are

- Go east from the ★ to F4. Go north to F5.
- Go north from the ★ to B5. Go east to F5.

Other paths to F5 are possible.

6. Using the dot grid below, describe the path you would take to get from X to Y to Z.



Check your answers in the Appendix.

Basic Number Facts Practice

Ask your home instructor to time you as you complete the following exercises. Your goal is to complete all 25 questions in each exercise in 2 minutes. At the end of 2 minutes, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 2 minutes. Mark these questions using the answer key as well.

Basic Number Facts Practice

Addition Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Subtraction Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Record your score on the Number Facts Progress Chart.

7. Addition Number Facts
Timed Exercise: 2 minutes

$3 + 8 =$	$9 + 7 =$	$6 + 5 =$	$5 + 8 =$	$4 + 7 =$
$\begin{array}{r} 7 \\ +\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ +\ 9 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ +\ 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ +\ 7 \\ \hline \end{array}$
$9 + 8 =$	$3 + 9 =$	$7 + 7 =$	$6 + 9 =$	$4 + 8 =$
$\begin{array}{r} 6 \\ +\ 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ +\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ +\ 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ +\ 6 \\ \hline \end{array}$
$7 + 9 =$	$6 + 8 =$	$9 + 4 =$	$5 + 5 =$	$7 + 4 =$

Check your answers in the Appendix.

STOP

8. Subtraction Number Facts
Timed Exercise: 2 minutes

$18 - 9 =$	$14 - 5 =$	$13 - 7 =$	$12 - 8 =$	$17 - 8 =$
$\begin{array}{r} 15 \\ -\ 7 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ -\ 9 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ -\ 6 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ -\ 9 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ -\ 7 \\ \hline \end{array}$
$12 - 6 =$	$16 - 8 =$	$15 - 9 =$	$13 - 6 =$	$16 - 9 =$
$\begin{array}{r} 14 \\ -\ 7 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ -\ 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ -\ 8 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ -\ 8 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ -\ 6 \\ \hline \end{array}$
$11 - 7 =$	$13 - 5 =$	$15 - 8 =$	$11 - 6 =$	$12 - 4 =$

Check your answers in the Appendix.

Turn to Assignment Booklet 8C, and complete the activities for Day 19.

Hidden Locations

Today you will have some fun with hidden locations. You will play some games with a partner to find a hidden "treasure" on a grid. In another activity, you will work with hidden paths. At the end of today's lesson, you will write a journal entry about the games you played.

Treasure Search Game 1

In this game your home instructor will hide a treasure symbol in one location on a grid. Your job will be to guess where the treasure is hidden. You must ask questions with **yes** or **no** answers to find the exact location.

Go to the Cut-Out Learning Aids section of the Appendix and find Day 20: Treasure Search Games 1 and 2. Cut out two blank grids and the small treasure box for Search Game 1. Notice that this treasure box is the same size as one square on the grid.

Your home instructor will explain how to play the game.

Note to the Home Instructor

You will help the student play several "hidden location" games today. Once the student understands the process, the games may be played with friends or other family members.

The game rules are written in bold type below.

Search Game 1

You and the student will each need a blank grid. Put a barrier between you so that you cannot see each other's paper. Place the small treasure chest on one of the squares on the grid. The student will try to locate the hidden treasure chest by asking questions with yes or no answers. The student will need to shade in or mark the squares that have been guessed on his or her blank grid in order to locate the treasure chest.

For example, the student may ask "Is the treasure in Column B?". If the answer is "no," then the student should put an X in the boxes or shade in the row to show that those spaces have been guessed. If the answer is "yes," the student will have to ask about specific locations in the column such as "Is it in B3?" before shading or marking in the squares. Let the student figure out his or her own strategy for finding the treasure.

After the student has found the treasure, trade roles so that the student hides the treasure and you guess where it is. Take turns guessing and hiding the treasure. When the student is ready for a more challenging game, go on to Search Game 2.

Search Game 2

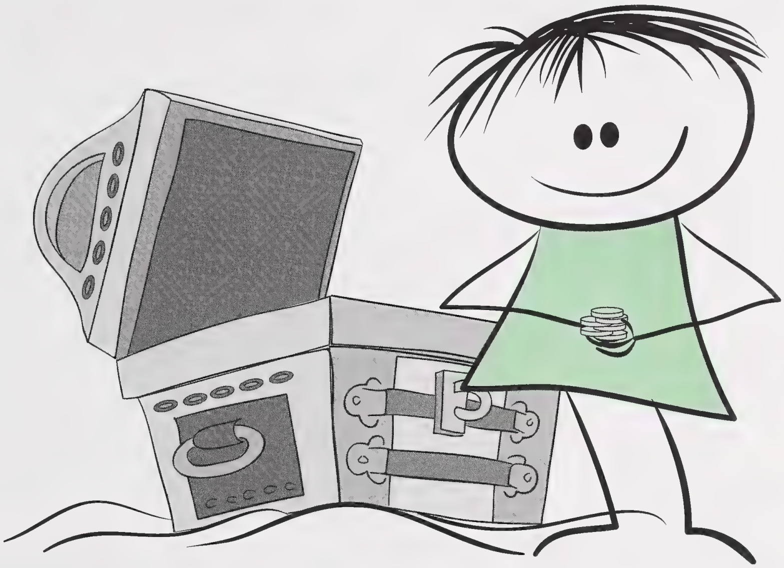
This game is played in the same way as Search Game 1.

Cut out the treasure chests for Search Game 2. You will notice that these chests take up more than one space on the grid. This time you will have to figure out which treasure chest your home instructor has hidden on the grid. You can do this by finding out which squares it covers on the grid. This will make the game a bit more challenging. You can ask only **yes** and **no** questions in this game, too.

Ask the home instructor to place one of the treasure chests on a new blank grid. The home instructor needs to hide the extra treasure chests so you can't see them.

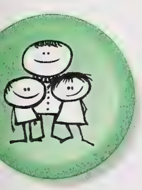
Take a blank grid for yourself so that you can mark your guesses. Ask questions to find the squares on the grid that the treasure chest covers. When you think you know which chest it is, make your guess.

You can take turns guessing and hiding the chests. After you have played a few times, go on to the next game.



Search Game 3

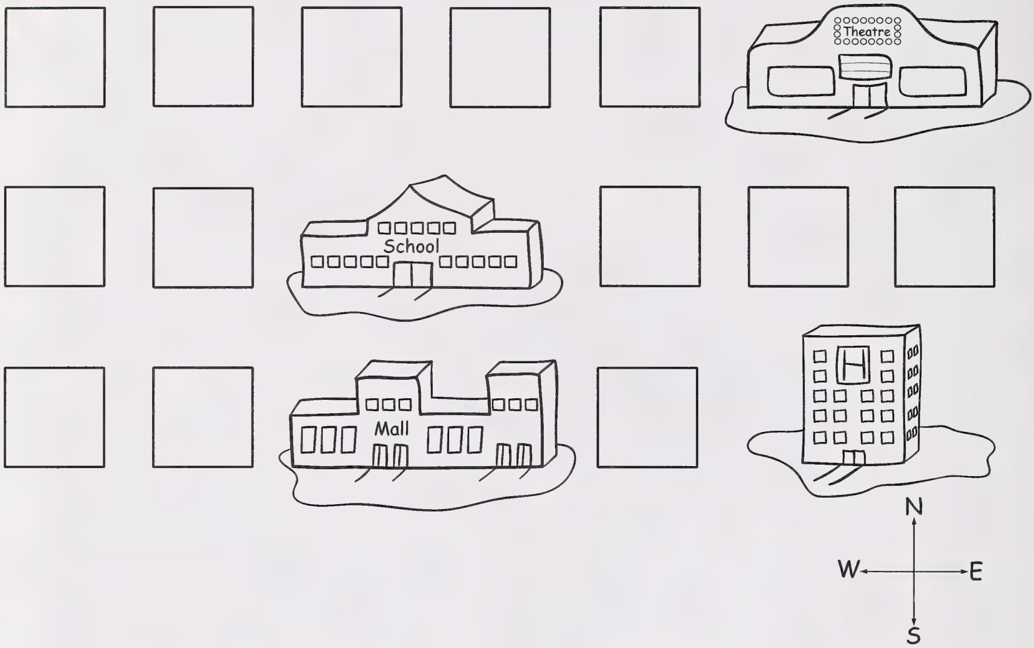
In this activity you will find a hidden location on a map. Your home instructor will give you directions and you can draw a path to find the location.



Note to the Home Instructor

Find Day 20: Search Game 3 in the Cut-Out Learning Aids section of the Appendix. When your student is ready, read the directions listed below the map. Ask the student to turn to the following page and draw the path on the map as you give instructions.

Listen to your home instructor. Use a pencil to draw your path on the map below.



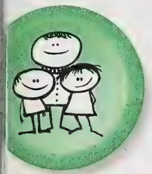
What is the hidden location? ______________________________

Check your answers in the Appendix.

Look at your home instructor's map. Is the path on it the same as your path?

If your path isn't the same, talk to your home instructor about where you went wrong. Try the game again if you wish.

Search Game 4

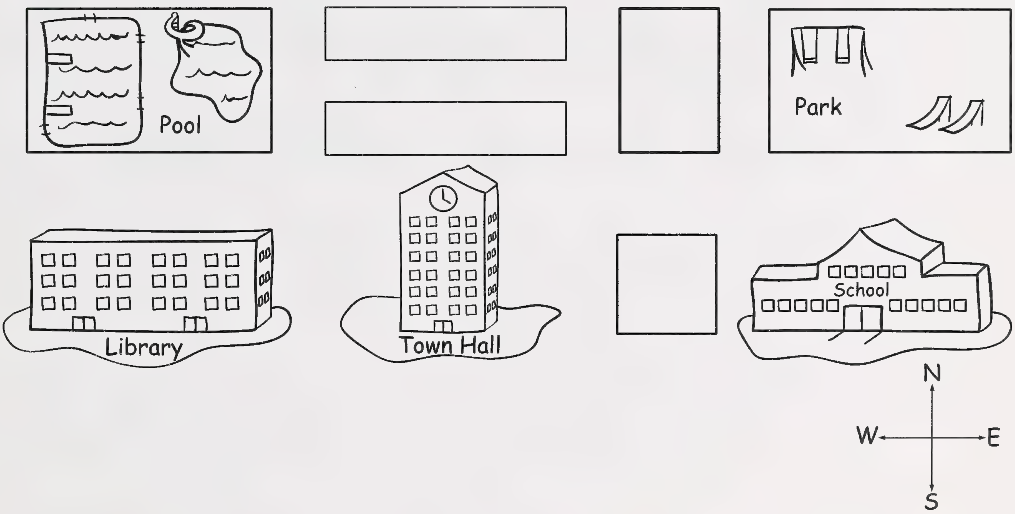


Now it's your turn to describe a path to your home instructor. You will see how accurate you are at giving directions.

Remember to use direction words such as **north**, **south**, **east**, and **west**. Use important buildings as landmarks if you need to. Use simple explanations.

Turn to the Cut-Out Learning Aids section of the Appendix. Find Search Game 4.

Ask your home instructor to use the map below to draw the path to the hidden location. When your home instructor is ready, start to describe the path.



Did your home instructor guess the hidden location?

Check to see if the home instructor's path is the same as the one you described. If it isn't the same, discuss what happened.

Just For Fun

Play some hidden location games with family members or friends. You can make your own grids from grid paper or on the computer. Make the grids larger if you like. Don't forget to label the rows and columns so you can guess locations.

Teach a partner how to play Search Game 1 and Search Game 2. You can both hide an object on a grid and take turns guessing to see who can guess the spot first.

You can change the game to make it more challenging. Try the following ideas or think of your own variations.

- Hide two or three objects (small squares or buttons) on the grid.
- Set a time limit. Can you find the object in 1 minute?
- Set a limit on the number of questions. Can you find the object in less than ten questions?

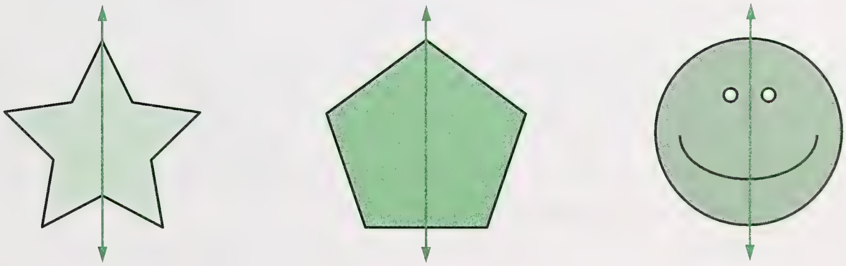
If your family has the game Battleship, try playing it with a partner. It is a hidden location game.

Turn to Assignment Booklet 8C, and complete the activities for Day 20.

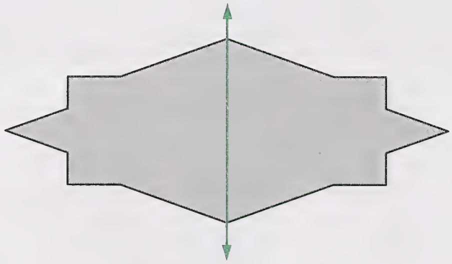
Grids and Reflections

In Day 5 you learned that two-dimensional figures are sometimes **symmetrical**. That is, they can be divided into halves that have the same size and shape.

You probably also remember that symmetrical objects can be divided into two parts that are like **mirror reflections** of each other.



If you could fold this figure on the line of symmetry, the two halves would match exactly.



In today's lesson you will create symmetrical figures on grids. It is easy to draw symmetrical figures on grids. You can count the squares to make the figures exactly the same size and shape on both halves.

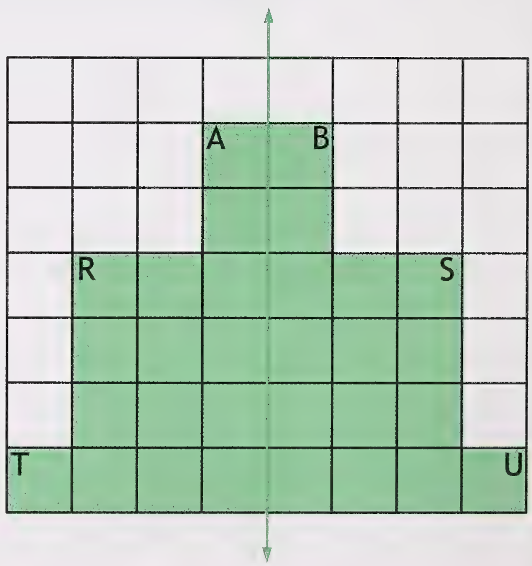
Is the design on the grid below symmetrical? The first step is to look for the dividing line, or the line of symmetry in the pattern. Next check to see if the two halves are the same size and shape.

In the grid, the square with the letter A in it is the same distance from the line of symmetry as the square with the letter B in it.

The letters R and S are both three squares from the line of symmetry.

The letters T and V are both four square from the line of symmetry.

If you fold this figure along the line of symmetry, the two sides would be the same size and shape.

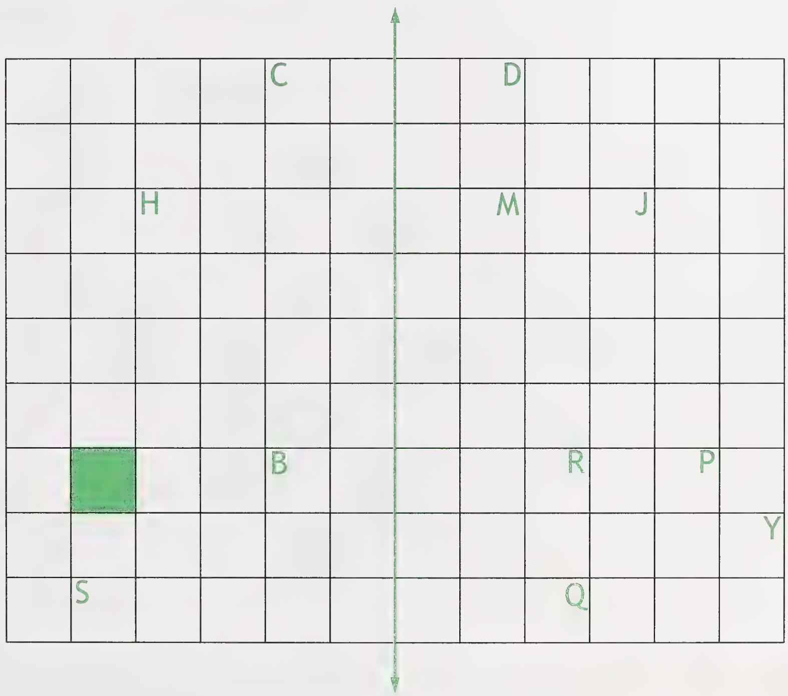


1. Answer these questions about the following grid.

   a. Letters C and D are __________ squares from the line of symmetry.

   b. Letters H and __________ are equal distances from the line of symmetry.

   c. The shaded square is the same distance from the line of symmetry as the letter __________.

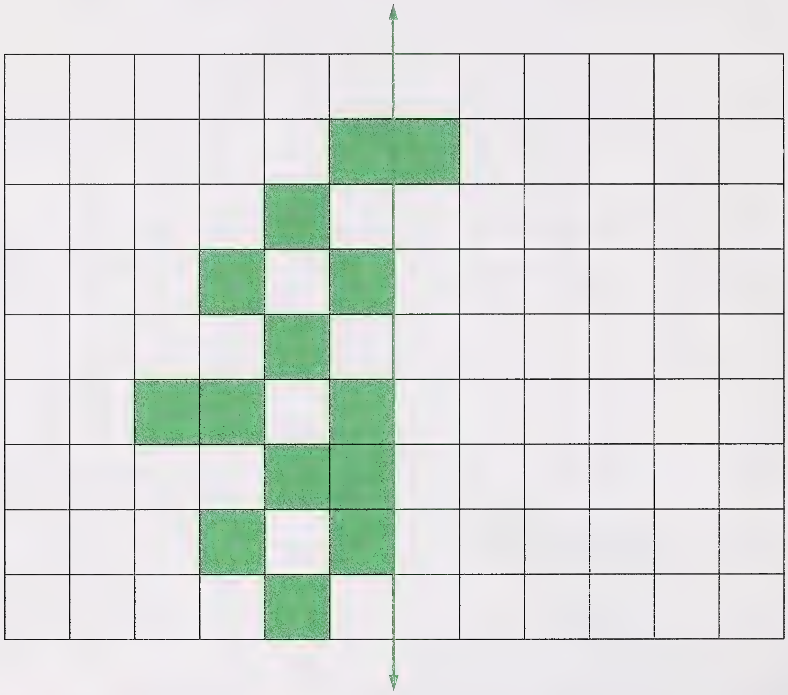


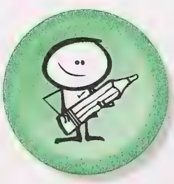
Check your answers in the Appendix.

By counting the number of spaces a square is away from the line of symmetry, you can make a symmetrical figure on a grid.

2. Use a coloured marker or your pencil to shade in squares on the right side of the line. Shade the squares so that the final design of squares will be symmetrical. The right side will be a reflection of the left side.

The first square on the right side has already been done for you.



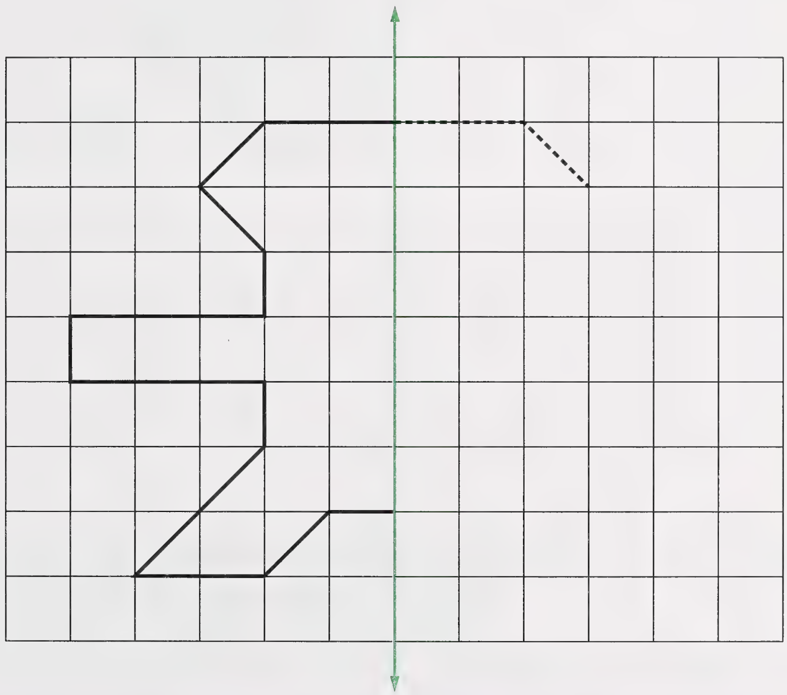


Check your answer in the Appendix.

Now try drawing lines on a grid to create a symmetrical figure.

3. Use your pencil to draw lines on the right side of the line of symmetry that will match the lines on the left.

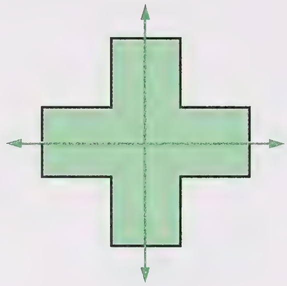
   For example, if the line on the left goes north 1 square then you must draw a line on the right that goes north 1 square. This is just like drawing a path on a map.



Check your answer in the Appendix.

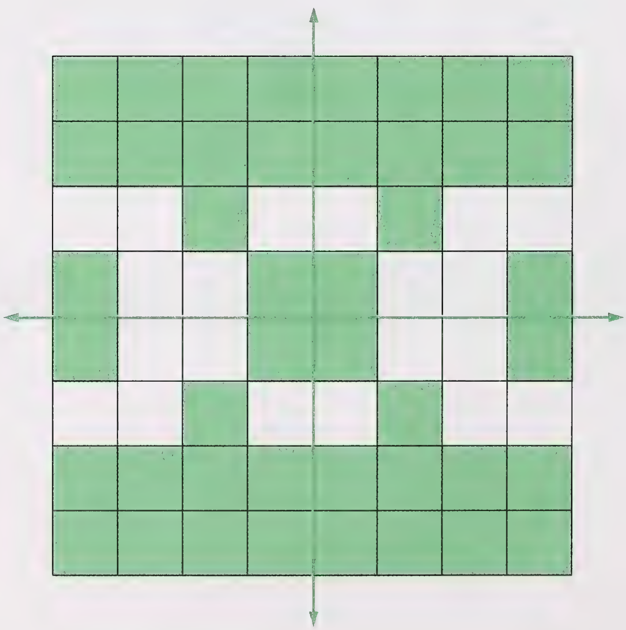
Two Lines of Symmetry

You can draw symmetrical figures using **two** lines of symmetry. You may remember that some 2-D figures can be divided more than one way to make identical halves.

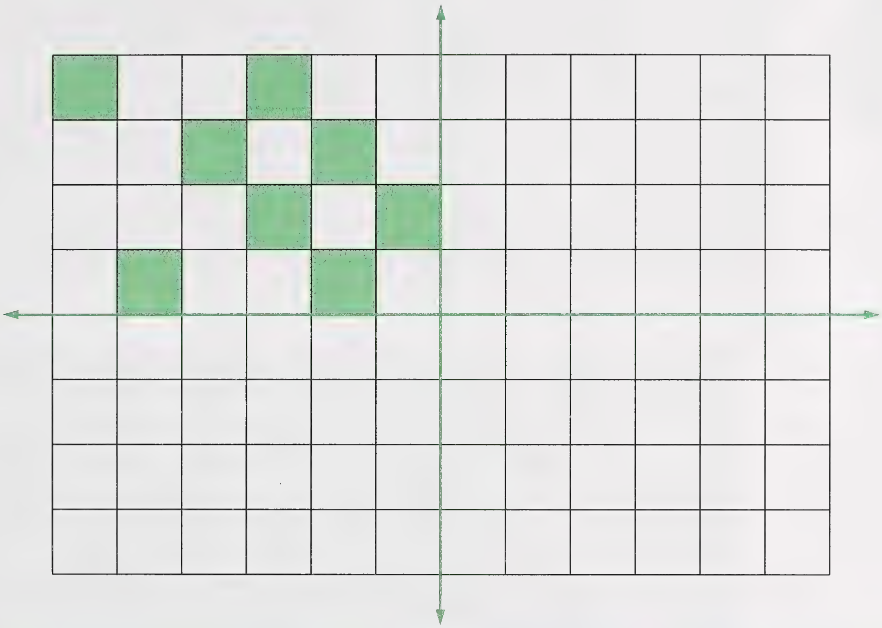


The figure above could be folded on either the horizontal line or vertical lines to make identical halves. The top and bottom of the figure are mirror images of each other. The left side and the right side are also mirror images of each other.

Grid patterns can also be created using two lines of symmetry.



4. Now try creating a pattern with two lines of symmetry on the grid below. Remember, the top and bottom of the pattern must be identical and the left and right halves must be identical. (**Hint:** Start with the upper right side of the grid.)



Check your answer in the Appendix.

Do you enjoy making symmetrical designs? You can create some designs of your own using the page Day 21: Grids for Symmetrical Designs found in the Cut-Out Learning Aids section of the Appendix. If you have other types of graph paper at home, you may use that instead.

Draw a line of symmetry on your grid. Make your design using pencil crayons or felt pens. You can make many beautiful patterns.

Basic Number Facts Practice

Ask your home instructor to time you as you complete the following exercises. Your goal is to complete all 25 questions in each exercise in 2 minutes. At the end of 2 minutes, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 2 minutes. Mark these questions using the answer key as well.

Basic Number Facts Practice

Multiplication Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Division Number Facts

Number Completed in 2 Minutes ______

Number Correct in 2 Minutes ______

Record your score on the Number Facts Progress Chart.

5. Multiplication Number Facts
Timed Exercise: 2 minutes

$3 \times 6 =$	$4 \times 9 =$	$8 \times 7 =$	$5 \times 9 =$	$7 \times 7 =$
$\begin{array}{r} 6 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ \times\ 3 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ \times\ 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ \times\ 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ \times\ 7 \\ \hline \end{array}$
$9 \times 6 =$	$7 \times 5 =$	$4 \times 8 =$	$9 \times 9 =$	$7 \times 6 =$
$\begin{array}{r} 6 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ \times\ 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ \times\ 4 \\ \hline \end{array}$
$7 \times 4 =$	$5 \times 6 =$	$8 \times 8 =$	$5 \times 7 =$	$6 \times 4 =$

Check your answers in the Appendix.

STOP

6. Division Number Facts
Timed Exercise: 2 minutes

$8\overline{)64}$	$9\overline{)45}$	$6\overline{)36}$	$8\overline{)24}$	$6\overline{)54}$
$81 \div 9 =$	$32 \div 8 =$	$63 \div 7 =$	$35 \div 5 =$	$24 \div 6 =$
$7\overline{)21}$	$6\overline{)48}$	$5\overline{)45}$	$9\overline{)72}$	$4\overline{)36}$
$28 \div 7 =$	$40 \div 8 =$	$27 \div 9 =$	$42 \div 6 =$	$63 \div 9 =$
$8\overline{)72}$	$7\overline{)49}$	$4\overline{)24}$	$5\overline{)20}$	$6\overline{)30}$

Check your answers in the Appendix.

Turn to Assignment Booklet 8C, and complete the activities for Day 21.

Putting It All Together (III)

In Section 3 you explored maps and grids. You learned the following things:

- The directions north, south, east, and west are useful when using maps and grids.
- Other directions, such as northwest, southwest, northeast, and southeast, may also be used.
- Objects can be found on grids by labelling the rows and columns.
- Paths can be followed by listening to accurate directions.
- Symmetrical shapes can be made on grids.

Today you will show what you have learned about maps and grids by completing several review questions. You will then work on a Challenge Activity related to the activities you have been working on in Section 3.

Part 1: Reviewing the Concepts

For Part 1 you will complete all of the review questions for Day 22 in Assignment Booklet 8C. First, you may wish to look back through the Student Module Booklet to review the concepts covered in Section 3.

Part 2: Challenge Activities

The Challenge Activities in Part 2 are designed to extend the ideas you have been learning and encourage you to explore new ideas about using maps and grids. In Assignment Booklet 8C you will find two Challenge Activities. Choose **either** Activity A **or** Activity B (**or** your may do both if you wish).

Turn to Day 22 in Assignment Booklet 8C, and complete all of the review questions in Part 1. Then do one or both of the Challenge Activities in Part 2.

Assessing What You Know (III)

This is the last day you will be working on Module 8: Exploring Geometry.

You are to complete **three** activities in Assignment Booklet 8C:

- Showing What You Can Do
- Basic Number Facts
- Thinking About What You Know

Read the explanation of the activities for all three parts before turning to Assignment Booklet 8C. Note that you will need the help of your home instructor for activities in Parts 1 and 2.

Part 1: Showing What You Can Do

For this activity you will need the help of your home instructor. You will be working on a short activity while your home instructor observes you. As you work through the problem, try to explain clearly what you are doing.

Your home instructor may ask you questions like the following:

- "How do you know that?"
- "Why did you decide to do that?"
- "How did you get that answer?"

Note to the Home Instructor

This performance assessment should take about 15 minutes. The Home Instructor's Assessment Page and accompanying Student's Assessment Page can be found in Day 23 of Assignment Booklet 8C. Remove both pages from the Assignment Booklet. Read over the student's page so you are familiar with the student's page so you are familiar with the student's assigned task. You should also preview the interview the interview questions and the checklist before the student begins working on the assigned task.

As the student works to answer the questions, encourage him or her to talk about what he or she is doing. **Allow the student to use any manipulatives or cut-out learning aids available to help solve the problem.** You may or may not wish to use some of the interview questions. Look for understanding and the student and the student's ability to explain clearly what he or she is doing to arrive at an answer. Indicate on the checklist whether you feel the student demonstrated the skills being assessed.

Attach both assessment pages to the Assignment Booklet before sending it in for marking.

Part 2: Basic Number Facts

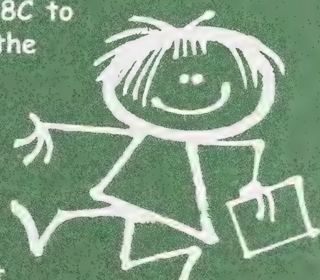
In this activity you will show how well you are learning the **multiplication** and **division** number facts. Ask your home instructor to time you as you do each test.

Part 3: Thinking About What You Know

In this activity you will spend some time looking back over what you learned in Section 3. Then you will complete some statements that tell about things you liked about this section of the module, things you didn't understand, and things you would like to learn more about. This information will be helpful to your teacher in determining how well you understood the information presented in the module.

When your home instructor is ready, turn to Assignment Booklet 8C, and complete the activities found in Parts 1, 2, and 3 of Day 23.

This is the end of Section 3: Finding Your Way. Check over Assignment Booklet 8C to make sure you have completed all of the assigned activities for each day. Remember that for Day 22 you need to complete the review questions in Part 1 and one or both Challenge Activities in Part 2.



Be sure to attach the **two** assessment pages from Day 22 to Assignment Booklet 8C. Then send Assignment Booklet 8C to your teacher.

Appendix

Glossary

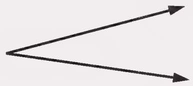
Answer Key to Self-Marking Activities

Cut-Out Learning Aids

Number Facts Progress Chart

Glossary

angle: the V-shape made when two straight lines intersect at a point



base: the surface of a geometric figure on which it can stand

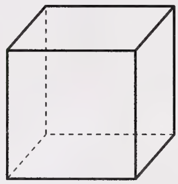
circle: a round shape created by a curved line

Every point on the line is the same distance from the centre.

cone: a solid, pointed object that has a flat, round base

congruent: having the same size and shape

cube: a solid with six equal, square sides



cylinder: a solid with two bases which are equal, parallel, circles with a curved surface

edge: a line at which two surfaces of a solid meet

endpoint: the spot where a line segment begins or ends

face: one of the plane surfaces of a solid

figure: a form, outline or shape

geometry: the study of shape and space

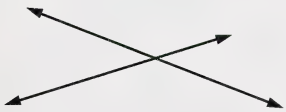
grid: the numbered squares drawn on maps and used as points of reference

hexagon: a six-sided polygon

horizontal line: a line that follows the horizon or goes across from left to right

intersect: to cross or meet

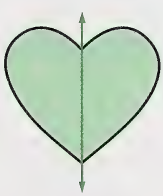
intersecting lines: lines that meet or cross



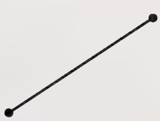
legend: the words and symbols accompanying a map or diagram

line: the straight or curved path that a point may be imagined to make as it moves; a long thin mark or stroke

line of symmetry: a line that divides a shape into two equal parts

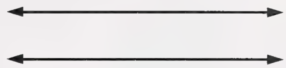


line segment: is a part of a line that has a starting point and a stopping point



octagon: an eight-sided polygon

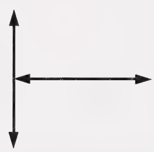
parallel lines: lines that are always the same distance apart



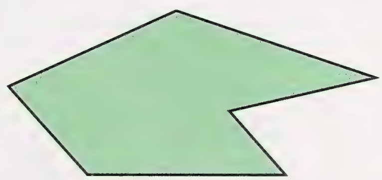
parallelogram: a four-sided figure whose opposite sides are parallel and of the same length

pentagon: a five-sided figure.

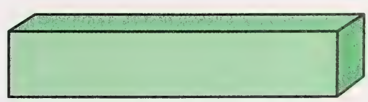
perpendicular lines: lines that form a right angle when they intersect



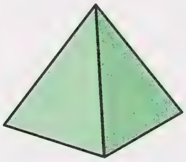
polygon: a flat shape or figure made by joining three or more straight lines



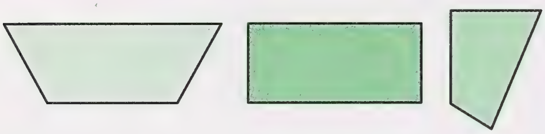
prism: a 3-D solid with two similar bases and at least three flat sides or faces



pyramid: a 3-D object with one base (a polygon) and flat sides or surfaces that meet at a point



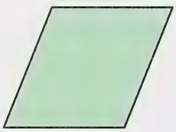
quadrilateral: a four-sided figure



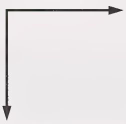
ray: a line with one endpoint coming out from a center

rectangle: a right-angled parallelogram that is not a square

rhombus: a parallelogram with no right angles and all sides are the same length



right angle: an angle forming a square corner



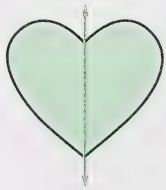
right triangle: a triangle with one right angle

scale: the size of a map or drawing compared with what it represents

sphere: a round solid figure

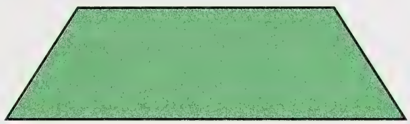
square: a four-sided figure with four right angles and four sides of the same length.

symmetrical: having identical parts when cut in half by a line

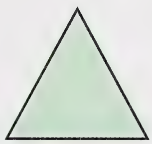


three-dimensional objects: objects with height, width, and depth

trapezoid: a four-sided figure with one pair of parallel sides.



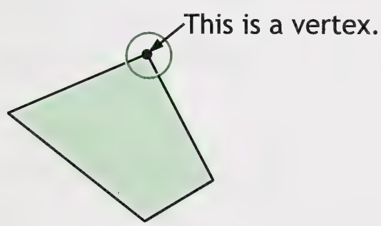
triangle: a three-sided figure



two-dimensional figures: flat figures having only height and width

vertex: a point where two lines meet (a corner)

The plural form of vertex is vertices.



vertical line: a line that extends from top to bottom

Answer Key to Self-Marking Activities

Day 1: Looking at Lines

1. Your answers should be similar to the examples provided.

a. a straight line: the edge of a table, a window sill, a wall

b. a curved line: the edge of a cup, a lampshade

c. a long line: the lines in a flooring pattern, the line between the ceiling and the wall

d. a short line: the edge of this paper or the edge of a pencil

e. lines that make a pattern: tiles on the wall or floor, a plaid shirt, a game board

f. lines that meet at a corner: the edges of a book, the corner of a desk

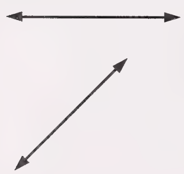
g. side-by-side lines: the lines on loose-leaf paper, the railings on a stairway

h. lines that cross each other: the checkerboard pattern in the flooring, the plaid pattern on the sofa

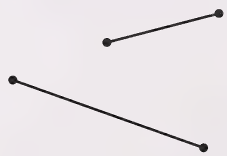
2. You may have listed these three places where you see lines outside. Other answers are possible.

- a power pole
- a sidewalk
- a roof

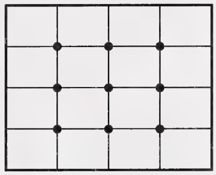
3. Lines



Line Segments



4. The number of intersections will depend on how you folded the paper. You probably got nine intersections.



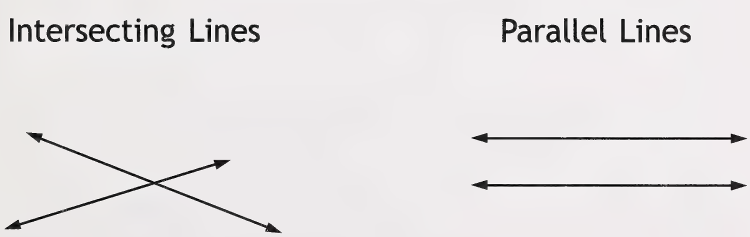
5. Following are some examples of intersecting lines. You only needed to list two examples.

- the edges of a desk that meet at the corner
- the lines in the plaid pattern of a sofa
- the lines that cross in the floor tiles or tiles on the wall
- the lines that cross on a checkerboard

6. Following are some examples of parallel lines. You only needed to list two examples.

- the opposite sides of a door
- the vertical railings on the stairway
- the stripes in a shirt or other fabric
- the horizontal lines on a calendar

7. Your lines may be longer or shorter than the ones shown here, or run in different directions. The intersecting lines must meet at some point. The parallel lines must always be the same distance apart.



8. **a.** parallel **b.** intersecting
c. parallel **d.** intersecting

9. Following are some examples of vertical lines. You only needed to list two examples.

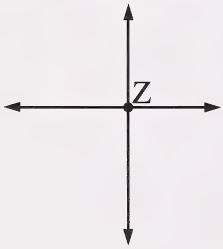
- the side of a picture frame
- a fence post
- a table or chair leg
- a chimney
- a flagpole
- a candlestick

10. Following are some examples of horizontal lines. You only needed to list two examples.

- the top edge of a stove or fridge
- a shelf in bookcase
- a tabletop or desktop
- a fence railing
- the top edge of a gate
- the top ridge of a roof
- the eavestrough on the edge of a roof

11. Your line should look similar to the one shown below.

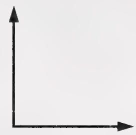
12. Your lines should look similar to the ones shown. Make sure you labelled the point where the lines meet with the letter Z.



Day 2: Looking at Angles

1. It should have been very easy to find many different angles in your home. Did you look at corners of furniture, corners of walls, or other corners? You may have also noticed angles in open books, in doorways, or in other objects around your home.

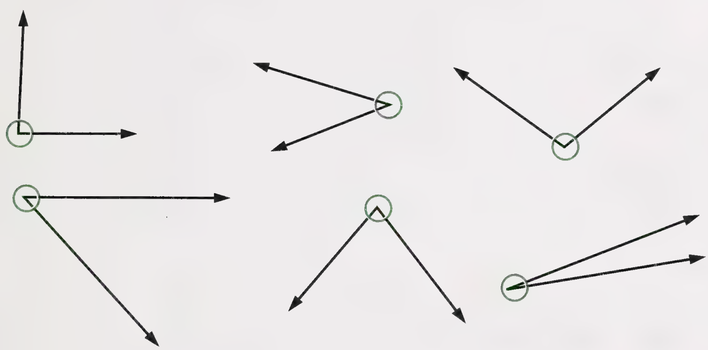
2. You should have been able to make a right angle (or very close to it).



3. There are many angles that you could have listed. Four samples are provided:

   - in doorways
   - in corners where walls meet
   - in furniture joints
   - in railings

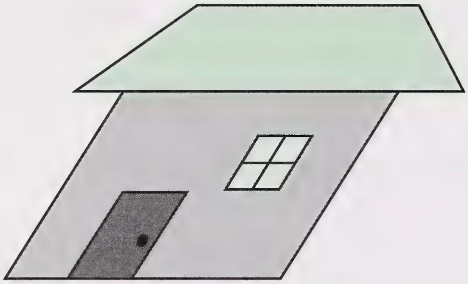
4.



5. You may have found right angles in the following places:

   - the corner of a book
   - the corner of a stove or fridge
   - the corner of a door frame
   - the corner of a cupboard door
   - the corner of a picture frame
   - the corner of a keyboard
   - the corner of a tissue box
   - the corner of a tile on the floor
   - the corner of a magazine

6. Your sketch should show leaning walls, doorways, windows, cupboards, and furniture.



7. You may have found angles smaller than a right angle in the following places:

   - the corner of partially opened book
   - the hands of a clock showing 2:00
   - pieces of pie cut in small wedges
   - the corner at the top of a capital letter A

8. You may have found angles larger than a right angle in the following places:

   - a book opened widely
   - hands of a clock showing 5:00
   - a pizza or pie cut into thirds

9. Angles a., c., and e. are right angles.

10. Angle b. is greater than a right angle.

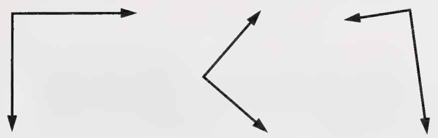
11. Angles a. and b. are smaller than a right angle.

12. Perpendicular lines are found where table legs meet the tabletop and where walls meet the ceiling.

13. Lines b. and c. are perpendicular lines.

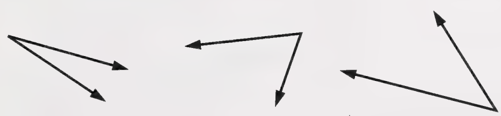
Taking Another Look

14. a. Following are examples of right angles.

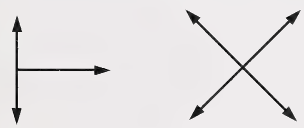


b. Following are examples of angles larger than a right angle.

c. Following are examples of angles smaller than a right angle.



d. Following are examples of perpendicular lines.



15. Division Number Facts

9	7	4	9	8
8	6	9	8	8
9	7	5	4	8
7	5	7	4	3
7	8	6	9	7

16. Multiplication Number Facts

48	27	45	28	18
81	7	32	15	40
25	42	35	63	54
36	40	64	21	16
49	36	72	24	30

Day 3: Triangles and Quadrilaterals

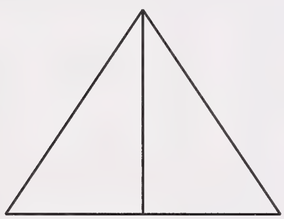
1. a. Your answers may be different than the ones given here. You were to provide two examples for each shape.

Triangle	Square	Rectangle
• the peak on a roof of a house or building • a road sign • a piece of pie or pizza	• the side of a sugar cube • the side of a toy block • the pattern on flooring • a quilt pattern	• the side of a book • the side of a box • a tabletop • a countertop • a door

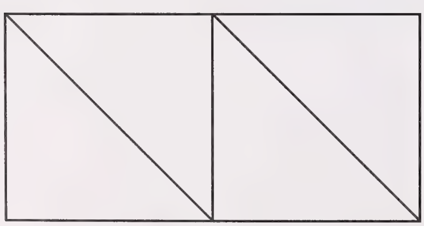
b. Your answer is probably yes. Rectangles are the most common shape used in construction and manufacturing.

2. You should have circled triangles a., d., and g.

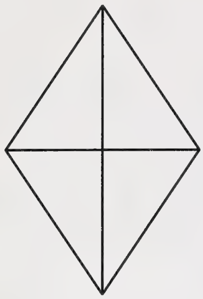
3. a. 2 right triangles



b. 4 right triangles

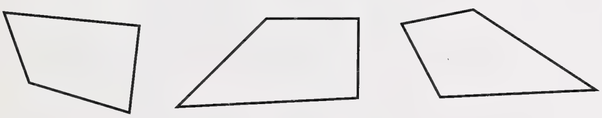


c. **4** right triangles

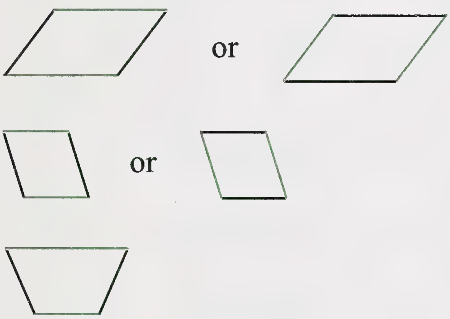


4. You should have circled figures a., d., f., and i.

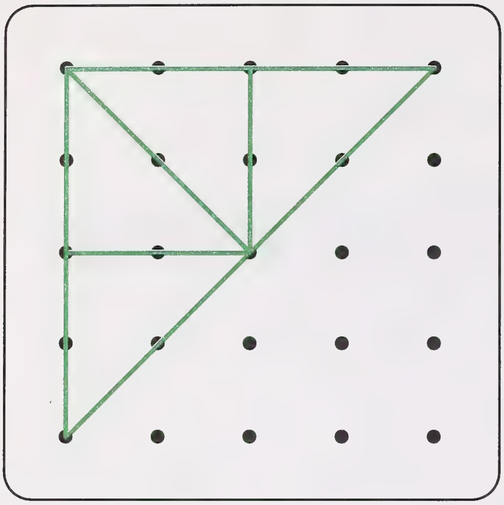
5. Your quadrilaterals should look something like the examples below. The sides should be straight lines.



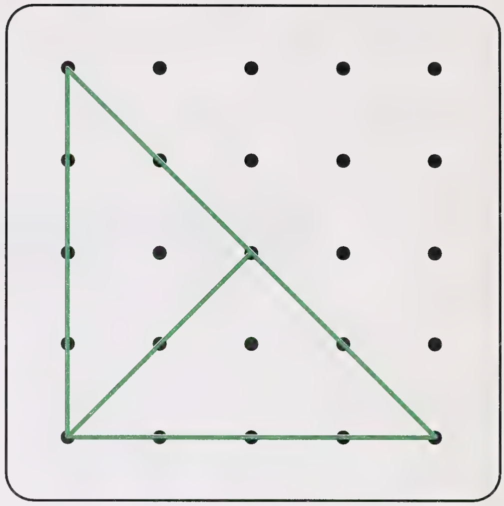
6.



7.

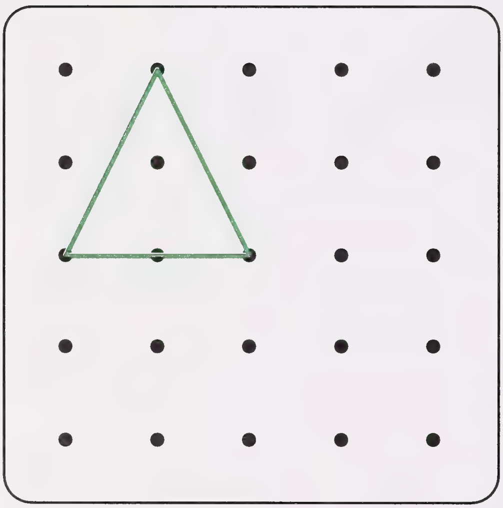


8.

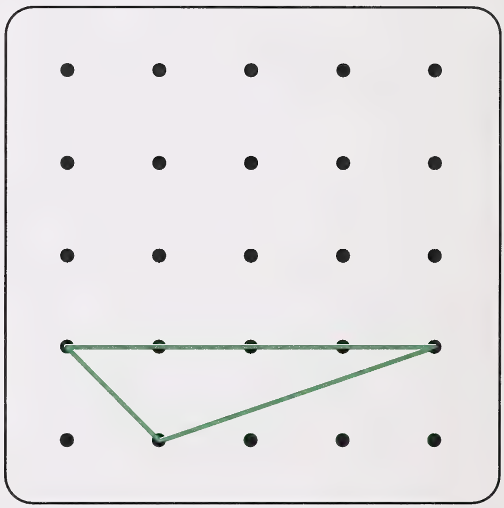


Yes, the two smaller triangles are both right triangles.

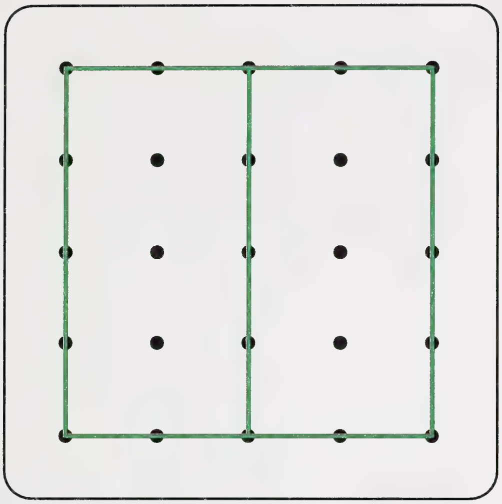
9. a.



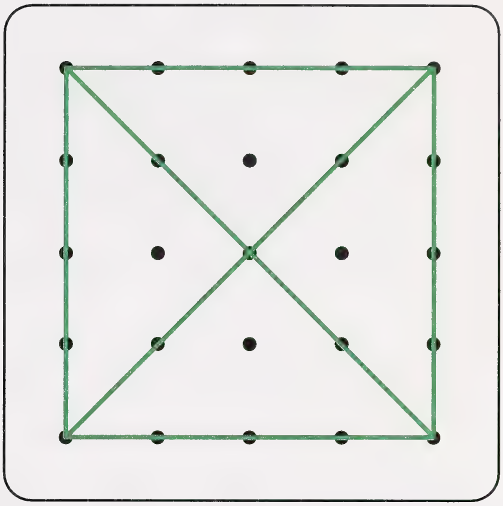
b.



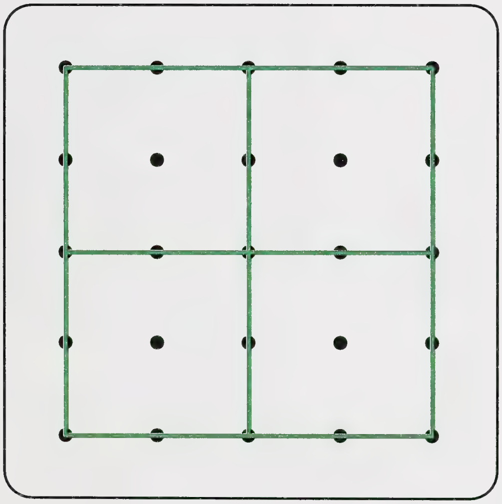
10. • large square divided into rectangles



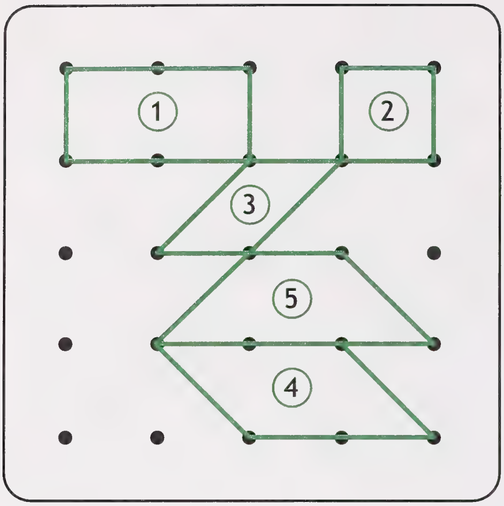
• large square divided into triangles



• large square divided into squares



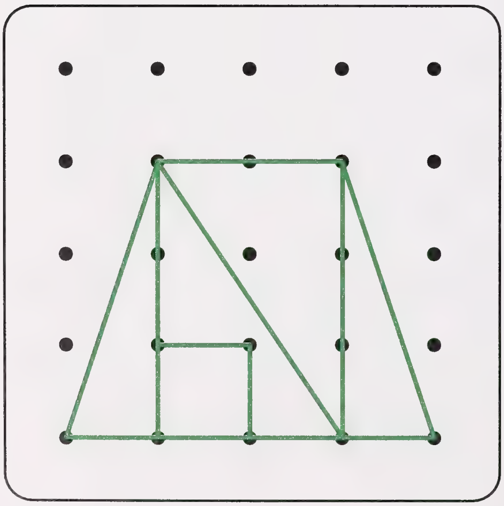
11.



You should have been able to make the following:

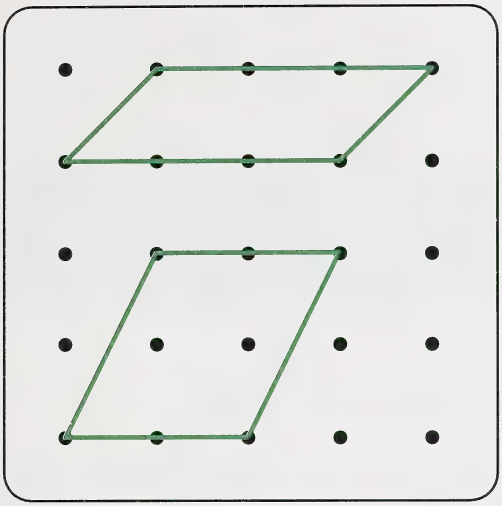
- rectangle 1
- square 2
- rhombus 3
- parallelogram 4
- trapezoid 5

12.



You should have been able to divide the trapezoid into triangles and squares or rectangles.

13.



14.

Quest 2000 Page 76

Skills Bank, Question 3

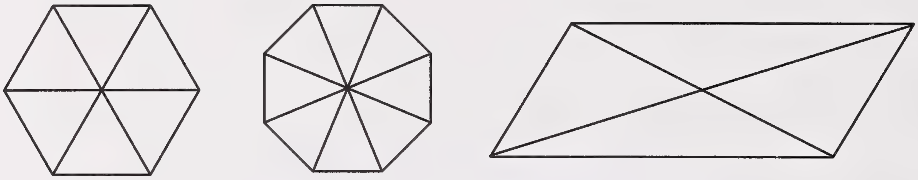
a. G

b.

All Sides Equal	Two Pairs of Equal Sides	No Sides Equal	Four Right Angles	One Pair of Parallel Sides	Two Pairs of Parallel Sides
C E	A B C D E F		A B C E	None of the figures has exactly 1 pair of parallel sides.	A B C E F

Just For Fun

Polygons should look like this when you draw lines from corner to corner.



15. a. triangles
b. Yes, some triangles in the polygons are similar in shape and size.

16. Your cutouts will make many creatures, patterns, buildings, trees, machines, and designs.

Day 4: More Polygons

1. Figures b., d., e., and f. are polygons.

2. You should have listed these quadrilaterals:

- parallelogram
- trapezoid
- square
- rectangle
- rhombus

3. a. It is called a **square**.
b. It is called a **rectangle**.

4. All the sides of a square are the same length, but rectangles only have two sides that are the same length.

5. a. It is a **rhombus**.
b. It is a **parallelogram**.

6. All the sides of a rhombus are the same length. The parallelogram has parallel sides that are the same length.

7.

Quadrilaterals				
Square	**Rectangle**	**Parallelogram**	**Rhombus**	**Trapezoid**
e. i.	d. g.	b. c. d. e. f. g. i.	c. e. i.	a. h.

8. Possible **pentagons** include the following:

- patio tiles or floor tiles
- wallpaper patterns

Possible **hexagons** include the following:

- wire fencing
- patio tiles or floor tiles
- wallpaper patterns
- shapes of lampshades

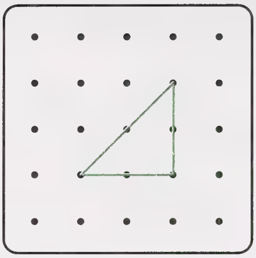
Possible octagons include the following:

- the face of a watch or clock
- patio tiles or floor tiles
- plate shapes

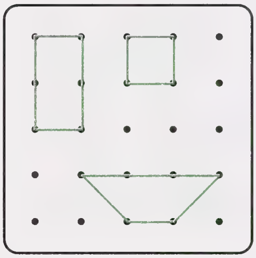
9.

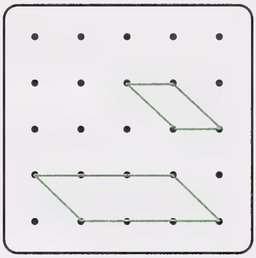
Quadrilateral	Pentagon	Hexagon	Octagon
a. g.	e. i.	b. d. h.	c. f.

10. a.

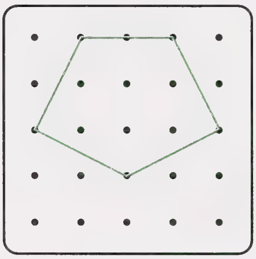


b.

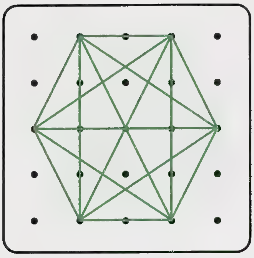




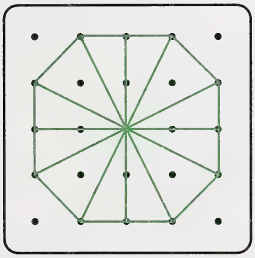
c. A five-sided polygon is a pentagon.



d. You may have made rectangles, squares, or triangles.



e. Answers will vary. You should be able to make at least eight triangles.



Day 5: It Looks the Same to Me

1. **a.** Congruent The figures are exactly the same size and shape.

   b. Not Congruent One star is larger and longer than the other star. They are not the same size or shape.

2. No

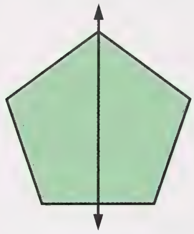
3. No

4. You should have circled figures a. and d. They are congruent.

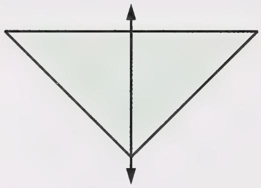
5. No, it is not a line of symmetry. The line divides the heart into two parts that are not the same. The top is bigger than the bottom. The top and bottom of the heart are different shapes.

6. You should have circled figures a., b., e., g., and i.

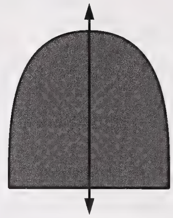
a.



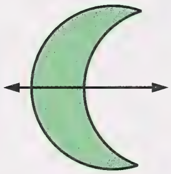
b.



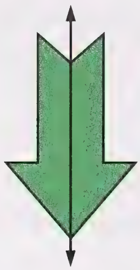
e.



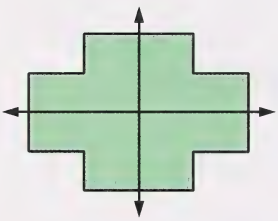
g.



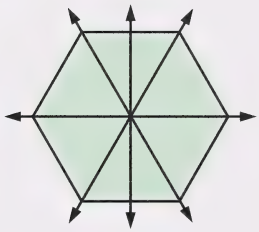
i.



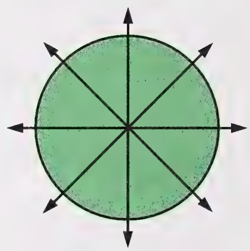
7. a.



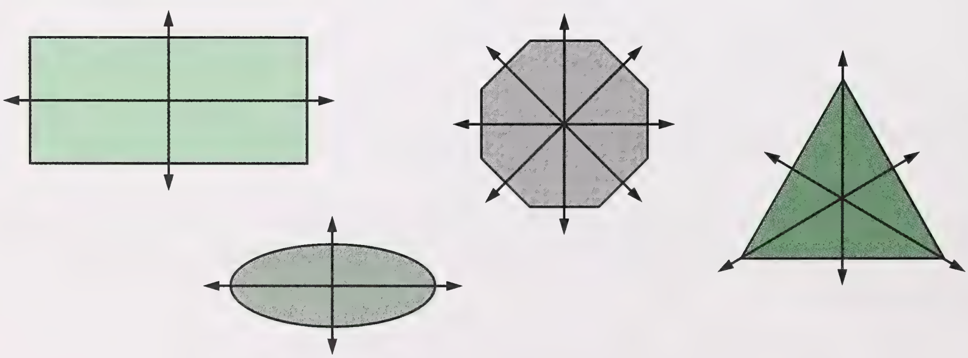
b.



c.



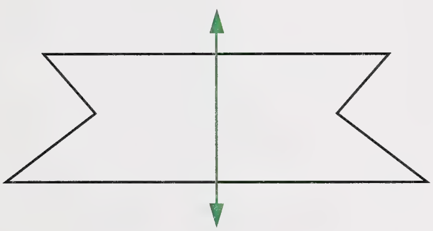
8. You may have included any of the following shapes. Make sure you showed two lines of symmetry.



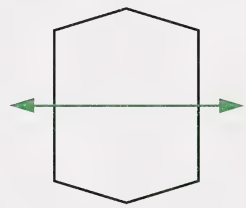
9. Examples of symmetrical figures in the home or outdoors could include the following:

- tabletops
- floor tiles
- car hubcaps
- plates or dishes
- chair backs
- wallpaper designs
- the numbers 3 and 8
- kites
- patio bricks

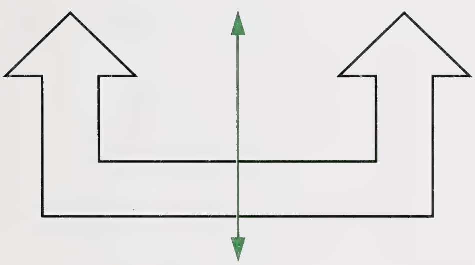
10. a.



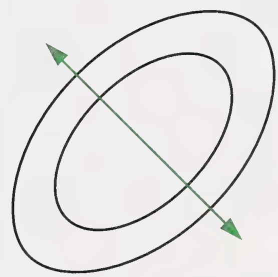
b.



c.



d.



Just for Fun

11. Capital letters that are symmetrical include the following:

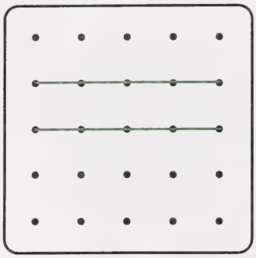
A B C D E H I K M O T U V W X Y

12. Lowercase or small letters that are symmetrical include the following:

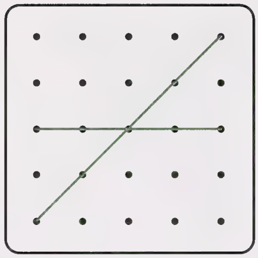
c l o v w x

Taking Another Look

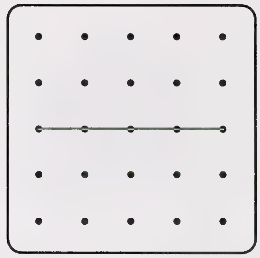
13.



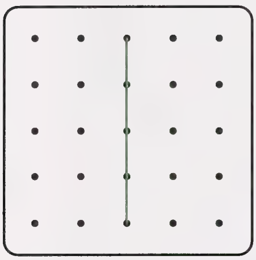
parallel lines



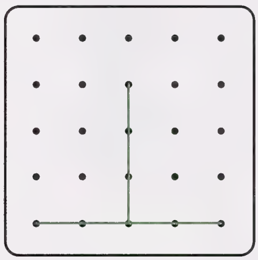
intersecting lines



horizontal line

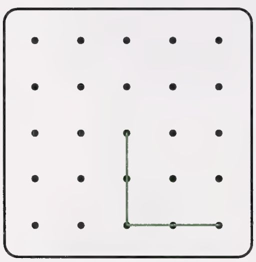


vertical line

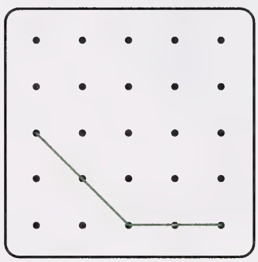


perpendicular lines

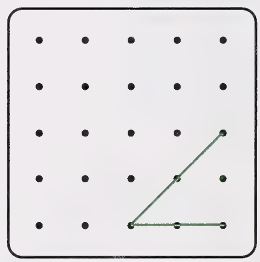
14.



right angle

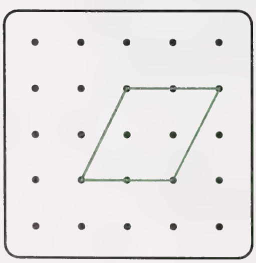


greater than right angle

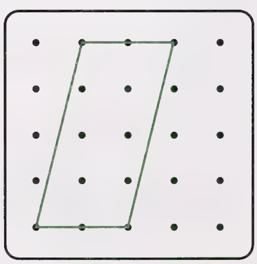


less than right angle

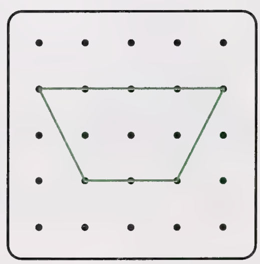
15.



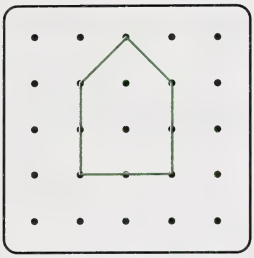
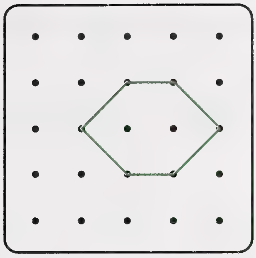
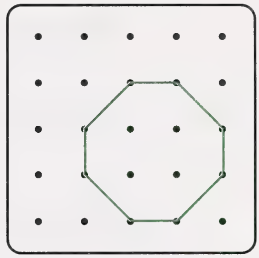
rhombus



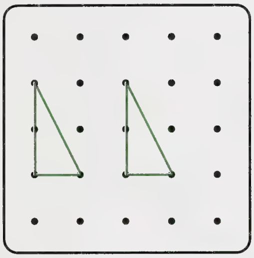
parallelogram

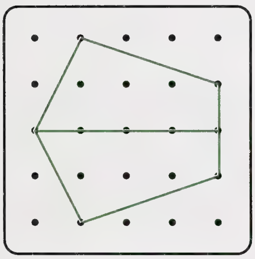


trapezoid

16.   

pentagon hexagon octagon

17. 

18. 

19. Your answers will depend on the shape of the figure. Symmetrical figures can be divided into two equal parts.

20. Addition Number Facts

15	12	13	11	15
14	11	11	13	14
12	10	18	12	13
11	17	13	12	16
16	15	15	10	14

21. Subtraction Number Facts

8	9	8	9	8
5	6	8	8	9
9	5	8	7	8
3	6	6	7	2
6	7	7	9	7

Day 6: Putting It All Together (I)

All activities are to be done in Assignment Booklet 8A. This work will be marked by your teacher.

Day 7: Assessing What You Know (I)

All activities are to be done in Assignment Booklet 8A. This work will be marked by your teacher.

Day 8: Looking at 3-D Objects

1. Following are some examples of 3-D objects. You should have listed four objects

- a microwave oven
- a fridge
- a TV
- stereo speakers
- a puzzle box
- a kettle
- a glass
- a dresser
- a house
- tin cans
- a toaster
- pots and pans
- a bed
- an easy chair
- a milk carton
- a bar of soap
- a pop bottle

2. Drawings b., c., e., and f. are 3-D.

3. **a.** 6
b. 4

4. **a.** 5
b. The faces are triangular and rectangular.

5. There are 12 edges in all.

6. There are more vertices than faces.

7. There are more edges than faces.

8. **a.** You should have found 24 combinations.

b.

ANSWER TO THE PROBLEM

There are 24 combinations:

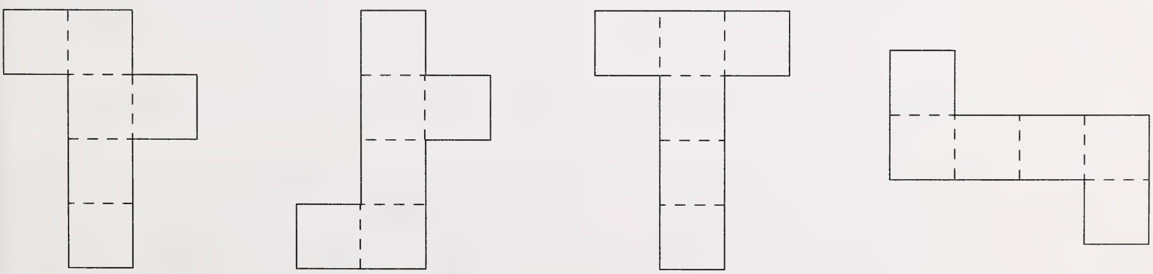
ABCD	CABD	BADC	DABC
ABDC	CADB	BACD	DACB
ACDB	CBAD	BCDA	DBCD
ACBD	CBDA	BCAD	DBDC
ADCB	CDBA	BDAC	DCBA
ADBC	CDAB	BDCA	DCAB

Day 9: Geometric Solids and Nets

1. You may have thought of examples that are different than those provided.

a. sphere: ball, globe, light fixture
b. cube: sugar cube, ice cube, box, child's block
c. cylinder: cans, tubes, posts or poles, columns, mugs
d. prism: boxes, flat-roofed buildings, fridge
e. cone: ice-cream cone, funnel, paper drinking cups
f. pyramid: Egyptian pyramids, pyramid-shaped buildings

2. Your net could resemble any of those shown below.

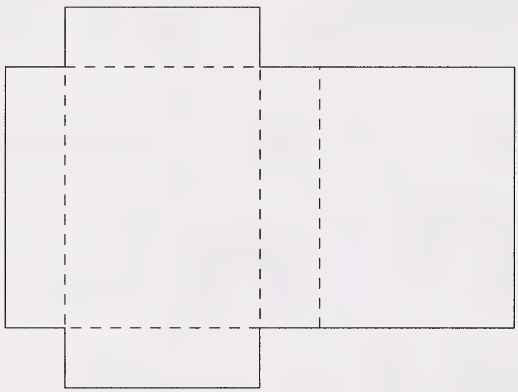


3. The front and back of the box are parallel. The two sides of the box are also parallel.

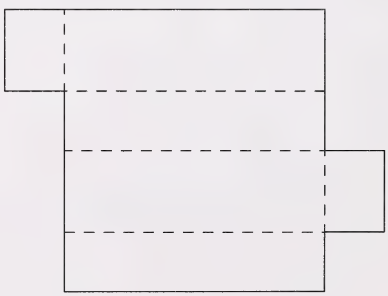
4. Following are some examples of rectangular prisms. You were to list three.

- a stove
- a fridge
- a microwave oven
- stereo speakers
- gift boxes
- a paperback novel
- a building block
- a CD case
- a cake pan
- a cookie box
- the box of a truck
- a garbage dumpster
- flat-roofed buildings
- high-rise towers in cities

5. Your cardboard box net should look like this if you followed the directions carefully.



6. This is the only other arrangment that will work with this net.



7. **a.** 160 **b.** 900
c. 1000 **d.** 6000
e. 10 000

8. **a.** 500 **b.** 3000
c. 500 **d.** 3000

9. Addition Number Facts

15	14	11	17	13
12	12	13	14	13
12	16	14	16	11
15	12	15	14	12
12	11	13	13	18

10. Subtraction Number Facts

9	9	9	9	3
5	7	8	7	8
8	6	8	8	7
5	9	5	9	7
8	7	6	9	9

Day 10: Prisms of All Sorts

1. **a.** 2 triangular faces
b. 3 rectangular faces
c. 5 faces altogether

2. Following are some examples of triangular prisms. You were to list three.

- parts of rooftops with triangular ends
- the top portion of a milk carton
- a wedge of cheese
- a pup tent
- an A-frame cabin

3. **a.** 2 pentagonal faces
   b. 5 rectangular faces
   c. 7 faces in all

4. The pentagonal prism has the most total faces. It has seven faces.

5. **a.** 6 rectangular faces
   b. 8 faces in all

6. **a.** Yes.
   b. It would be an octagonal prism.
   c. The bases would be octagonal.

7. **a.** 1023

   b.

ANSWER TO THE PROBLEM
After 10 days you would have received a total of $1023.

Just for Fun

8. **a.** On the 12th day, you would get $2048.

   b. On the 15th day, you would get $16 384.

9. You could buy many things with that much money.

10. You were probably surprised at how quickly the money added up when it was doubled each day.

Day 11: Looking at Pyramids

1. 4 sides

2. **a.** 4 triangular faces
   b. 5 faces in total

3. It is a square-based pyramid.

4. Following are some possible examples of pyramid shapes in buildings:

- cottage-style roofs on houses
- rooftops of some schools, government buildings, churches, stores
- glass rooftop windows in malls

5. a. 5 faces in total
b. 4 triangular faces

6. It is a triangular-based pyramid.

7. a. 620 **b.** 3700
c. 9400 **d.** 550
e. 2800

8. a. 600 **b.** 6800
c. 750 **d.** 5200
e. 700

9. Multiplication Number Facts

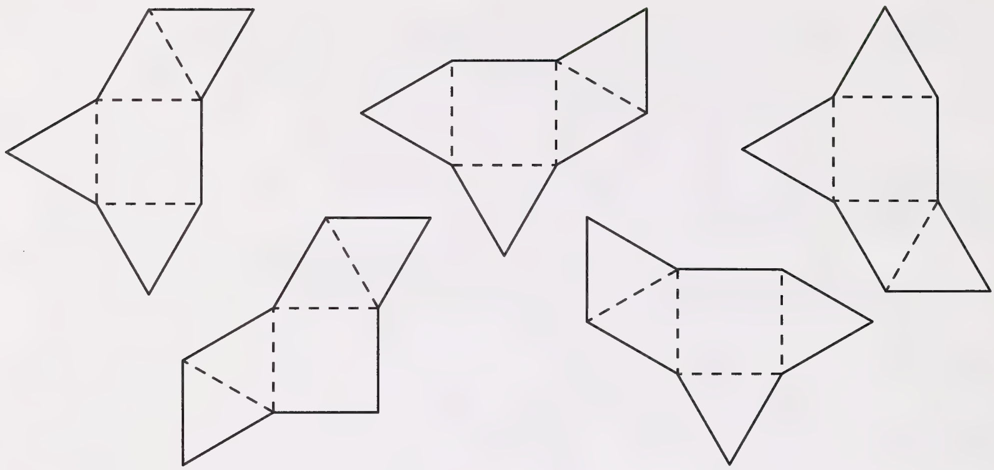
15	48	45	49	32
30	81	24	35	24
25	54	27	56	40
36	45	72	42	40
32	35	36	18	21

10. Division Number Facts

9	9	3	5	9
8	4	8	5	5
8	7	3	7	9
9	6	6	6	2
5	6	9	8	7

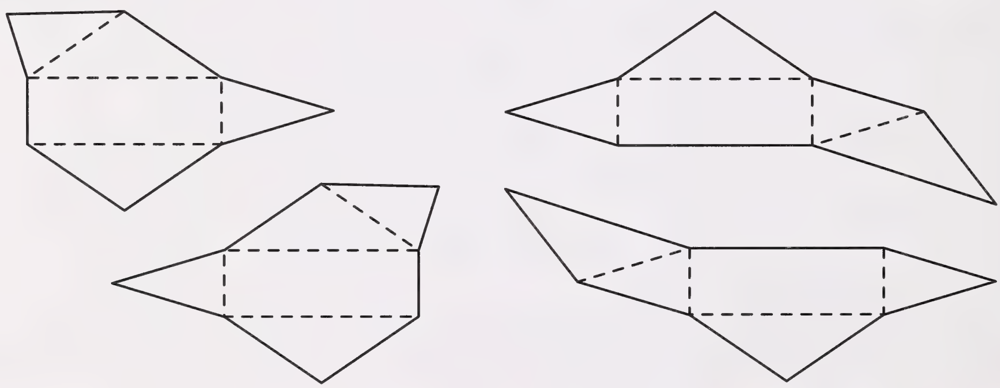
Day 12: Making Nets for Pyramids

1. Your nets might look like

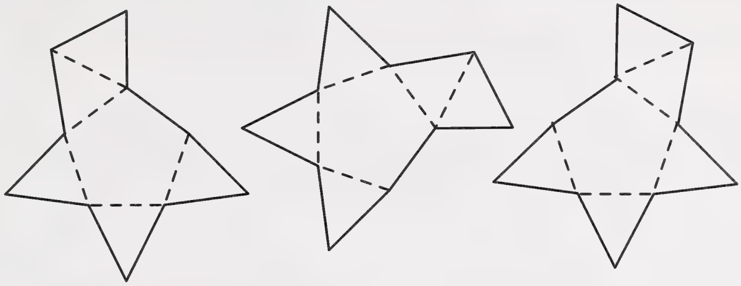


2. Net a. would not make a square-based pyramid.

3. Your nets might look like the ones shown.



4. Your nets might look like the ones shown.



5. a. You should have counted 6 handshakes.

b.

ANSWER TO THE PROBLEM
There were 6 handshakes in all.

If the people shaking hands could be named A, B, C, and D, then the handshakes could be listed as follows:

AB, AC, AD, BC, BD, CD

It may seem like there should be more combinations, but remember that the people only shake each other's hand once. (For example, a shake between A and B is the same as a shake between B and A. This combination should be counted only once. Reversing the letters does not mean a new handshake.)

Day 13: Comparing Prisms and Pyramids

1. You should have included three of the following facts in your answer:

   - Pyramids have one base.
   - They have three or more triangular faces.
   - They are named for the shape of their bases.
   - The base is the shape of a polygon.
   - The sides meet at a point or vertex at the top.
   - The number of faces is equal to the number of sides on the base.

2.

	Rectangular Pyramid	Rectangular Prism
Number of Faces	5	6
Number of Edges	8	12
Number of Vertices	5	8
Shapes of Faces	triangular, rectangular	rectangular or square
Any Right Angles?	Yes (in base only)	Yes (every corner)
Any Parallel Lines?	Yes (in base only)	Yes (every opposite edge)

3.

Pyramids	Prisms
• have one base	• have two bases
• have some triangular faces	• have rectangular faces
• triangular faces meet at a point	• rectangular faces join two bases
• bases are polygons	• bases are polygons
• have few right angles	• have many right angles
• triangular faces are not parallel	• all opposite faces are parallel

4. Addition Number Facts

13	15	12	11	14
12	11	13	13	14
11	15	14	11	14
12	13	12	11	14
12	18	16	12	14

5. Subtraction Number Facts

9	8	8	8	9
6	7	9	5	9
2	7	9	8	3
7	7	4	8	7
6	6	6	5	5

Day 14: Putting It All Together (II)

All activities are to be done in Assignment Booklet 8B. This work will be marked by your teacher.

Day 15: Assessing What You Know (II)

All activities are to be done in Assignment Booklet 8B. This work will be marked by your teacher.

Day 16: Using Directions

1. **a.** The triangle is **southwest** of the trapezoid.
   b. The parallelogram is **southeast** of the trapezoid.
   c. The hexagon is **northwest** of the pentagon.
   d. The square is **northeast** of the pentagon.

2. You should finish back at the place where you started.

3. **a.** Building C is on the **south** side of Hastings Street.
   b. Building B is located **east** of Building A.
   c. Building A is four blocks **west** of Building C.
   d. Building C is two blocks **east** of Building B.

4. Your directions could be similar to these:

   - Walk one block north until you are at the southwest corner of the church.
   - Turn east and walk three more blocks.
   - Turn north and walk one block.
   - The store is on the east side of the street.

5. **a.** When two 9s are multiplied, the answer ends in a **1**.
   b. When four 9s are multiplied, the answer ends in a **1**.
   c. Whenever an even number of 9s is multiplied, the answer will end in a 1.

6. **a.** When three 9s are multiplied, the answer ends in a **9**.
   b. When five 9s are multiplied, the answer ends in a **9**.
   c. Whenever an odd number of 9s is multiplied, the answer ends in a 9.

7. Based on the information in questions 5 and 6, you should have predicted that when twenty 9s are multiplied, the ones digit of the final product will be a 1. Your reason should be that 20 is an even number. The pattern of numbers shows that when an even number of 9s are multiplied, the ones digit is a 1.

8.

ANSWER TO THE PROBLEM
When twenty 9s are multiplied together, the ones digit of the final product will be a 1.

9. Multiplication Number Facts

30	18	56	18	32
21	63	40	42	36
35	72	27	36	36
24	81	48	25	49
24	63	40	54	45

10. Division Number Facts

9	9	4	5	7
3	8	9	4	5
8	7	4	9	6
8	6	7	5	6
4	8	7	5	8

Day 17: Learning More About Maps

1. Your map may show different features. Some common features include the following:

- highways
- roads
- rivers
- cities
- towns
- lakes
- oceans
- mountains
- parks
- provincial or national boundaries
- streets
- landmarks or points of interest
- airports
- railways
- ferries

2. Your map may have different symbols. Some common ones are shown.

3. **Quest 2000** **Pages 214 and 215**

1. Brook Street, Derry Road, and Hill Street run parallel to Main Street.

2. Brook Street intersects Park Street at the Library. Main Street also intersects Park Street at the Library.

3. a. Your answer may be different than the one given here. Have your home instructor check your answer to be sure that it is correct. One possible route would be:

   - From the library steps, walk west to the corner of Park Street and Main Street.
   - Turn north and walk along Main Street until you get to Valley Drive.
   - Follow Valley Drive west until you reach Hill Street.
   - The Post Office is at the northeast corner of Hill Street and Valley Drive.

4. In what direction would you be travelling from the Hospital to the Library? **East** From the library to the hospital? **West**

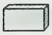
5. From the Library door it would be about 190 m to the intersection. (200 m is also a close estimate.) Each square stands for 20 m. There are 9 or 10 squares from the door to the intersection.

   9×180 m $\qquad\qquad (10 \times 20 = 200 \text{ m})$

6. It is farther from Leisure Lane to Main Street. (The distance from Park Street to Valley Drive is 100 m.)

7. Hill Street and Brown Street are perpendicular.
   Hill Street and Valley Drive are perpendicular.
   Valley Drive and Derry Road are perpendicular.
   Valley Drive and Main Street are perpendicular.
   Derry Road and Park Street are perpendicular.
   Hill Street and Park Street are perpendicular.
   Brook Street and Park Street are perpendicular.
   Main Street and Park Street are perpendicular.

Day 18: Exploring Grids

1. a. The  is located at the intersection of **Column G** and **Row 2**.
   b. The  is located at the intersection of **Column B** and **Row 5**.
   c. The  is located at the intersection of **Column A** and **Row 1**.
   d. The  is located at the intersection of **Column E** and **Row 6**.

2. a. G2 b. B5
   c. A1 d. E6

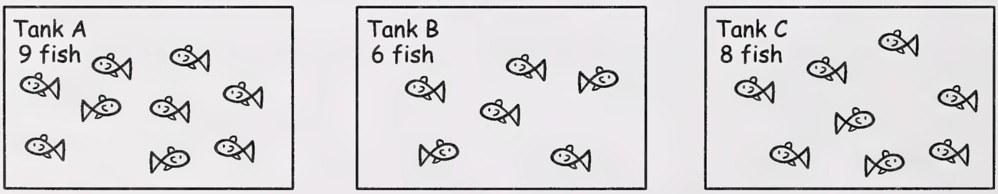
3. Your answer might be like this:

   - From the star at A1, go north (or up) five squares until you reach A6.
   - At A6, turn east (or right) and go four squares until you reach E6.

   Your answer might also be:

   - From the star at A1, go east four squares until you reach E1.
   - At E1, turn north and go five squares until you reach the arrow at E6.

4. a. Straw house: **C8** b. Bridge: **E5**
   c. Apple tree: **M9** d. Brick house: **I4**
   e. Hill: **M3** f. Stick house: **A2**

5. a. 

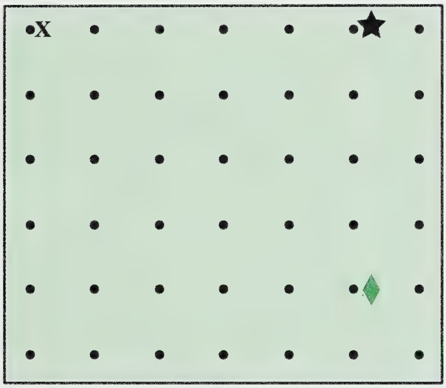
$$B + C = 14$$
$$6 + C = 14$$
$$14 - C = 6$$
$$C = 8$$
$$9 + 6 + 8 = 23$$

b.

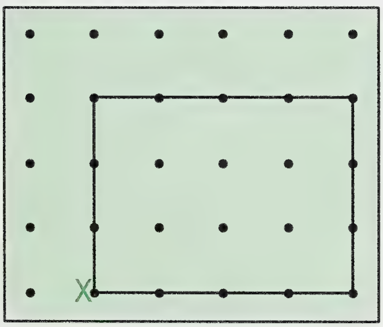
ANSWER TO THE PROBLEM
The total number of tropical fish in the display is **23**.

Day 19: More About Grids

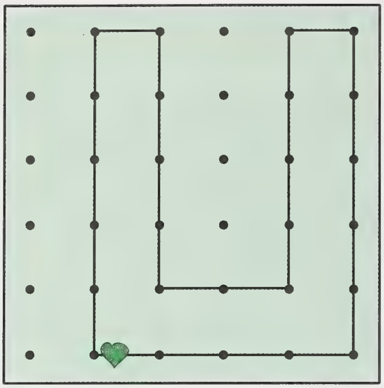
1. The star and the x should be drawn as shown here.



2. a.



b. You should have made a rectangle.

3. a. 

b. You should have made a letter U.

4. Your directions should be similar to one of these samples:

Directions 1

- Start at the z.
- Go five dots north.
- Go two dots west.
- Go two dots south.
- Go three dots west.
- Go three dots south.
- Go five dots east.

Directions 2

- Start at the z.
- Go five dots west.
- Go three dots north.
- Go three dots east.
- Go two dots north.
- Go two dots east.
- Go five dots south.

5. **a.** ♠ is at C2.

   b. M is at D6.

   c. ★ is at B4.

   d. ⊕ is at E1.

   e. S is at F5.

6. Your directions should be similar to one of these:

   - Start at the X.
   - Go east to D4.
   - Go north to D5.
   - From the Y, go east to G5.
   - Go south to G3

   or

   - Start at the X.
   - Go north to B5.
   - Go east to D5.
   - From Y go east to G5.
   - Go south to G3.

7. Addition Number Facts

11	16	11	13	11
15	18	13	14	15
17	12	14	15	12
12	12	16	16	11
16	14	13	10	11

8. Subtraction Number Facts

9	9	6	4	9
8	8	8	2	9
6	8	6	7	7
7	3	3	6	9
4	8	7	5	8

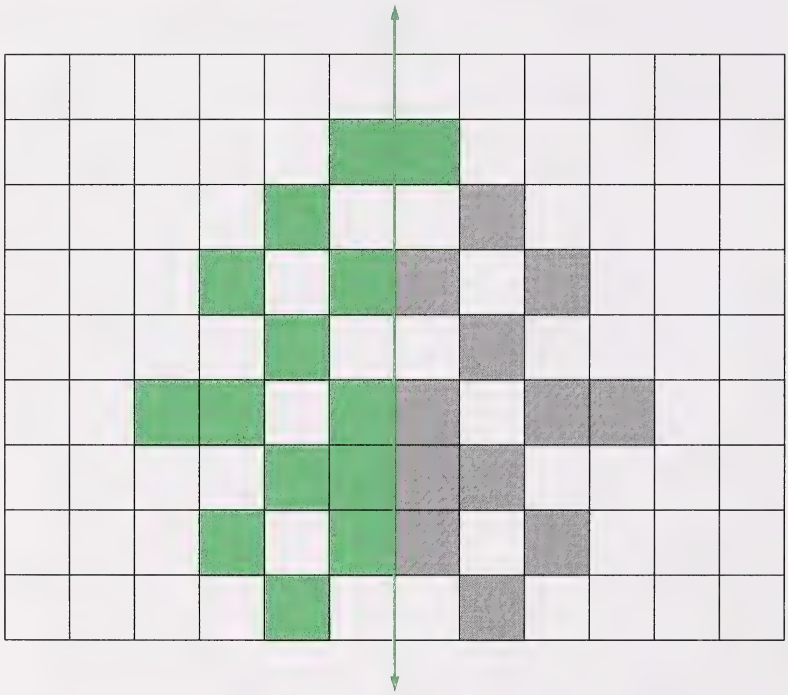
Day 20: Hidden Locations

The hidden location is the mall.

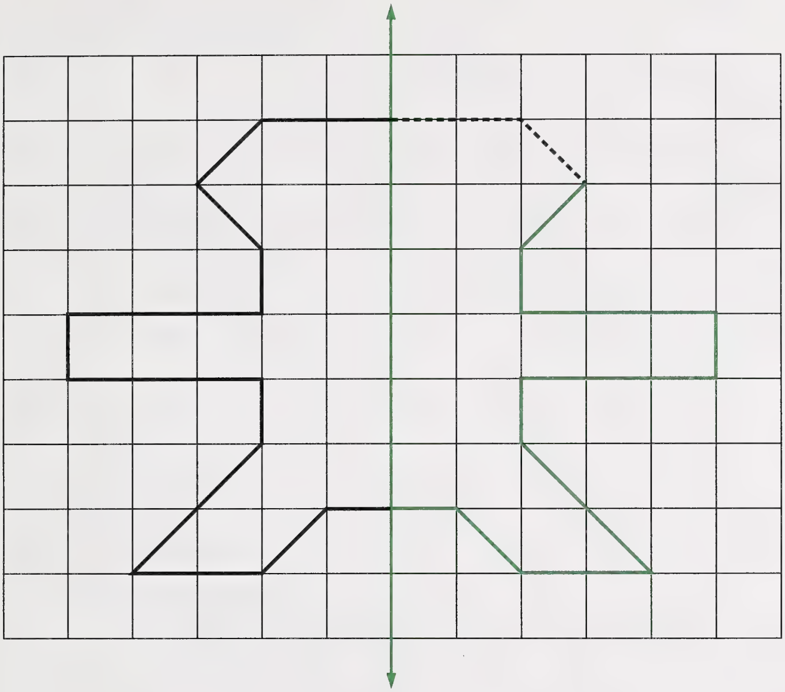
Day 21: Grids and Reflections

1. **a.** Letters C and D are **two** squares from the line of symmetry.
   b. Letters H and **J** are equal distances from the line of symmetry.
   c. The shaded square is the same distance from the line of symmetry as the letter **P**.

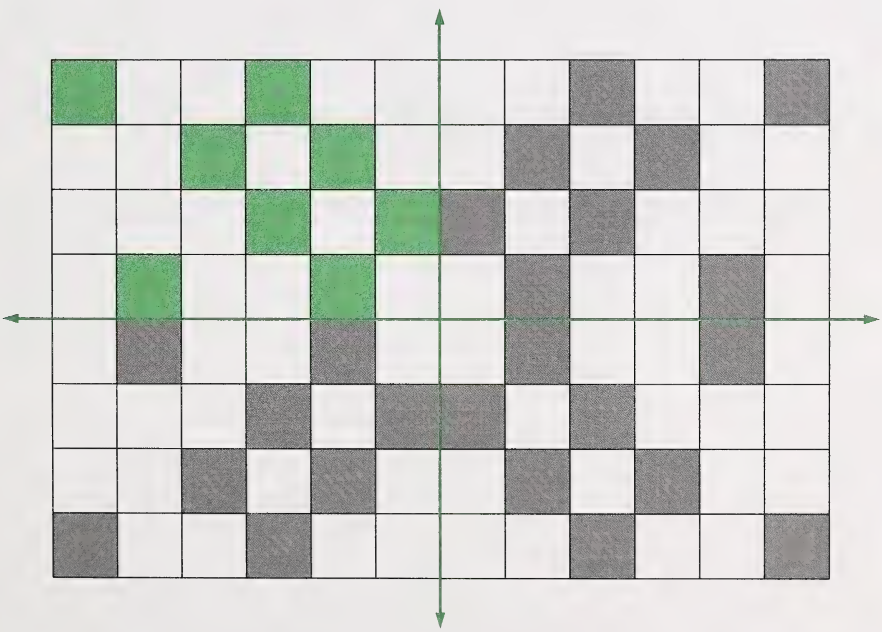
2.



3.



4.



5. Multiplication Number Facts

18	36	56	45	49
48	27	20	24	21
54	35	32	81	42
36	72	25	54	36
28	30	64	35	24

6. Division Number Facts

8	5	6	3	9
9	4	9	7	4
3	8	9	8	9
4	5	3	7	7
9	7	6	4	5

Day 22: Putting It All Together (III)

All activities are to be done in Assignment Booklet 8C. This work will be marked by your teacher.

Day 23: Assessing What You Know (III)

All activities are to be done in Assignment Booklet 8C. This work will be marked by your teacher.

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Basic Number Facts: EyeWire, Inc.
Computers: PhotoDisc, Inc. 2000
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Page

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4 PhotoDisc, Inc.
5 Corel Corporation
8 EyeWire, Inc.
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Cut-Out Learning Aids

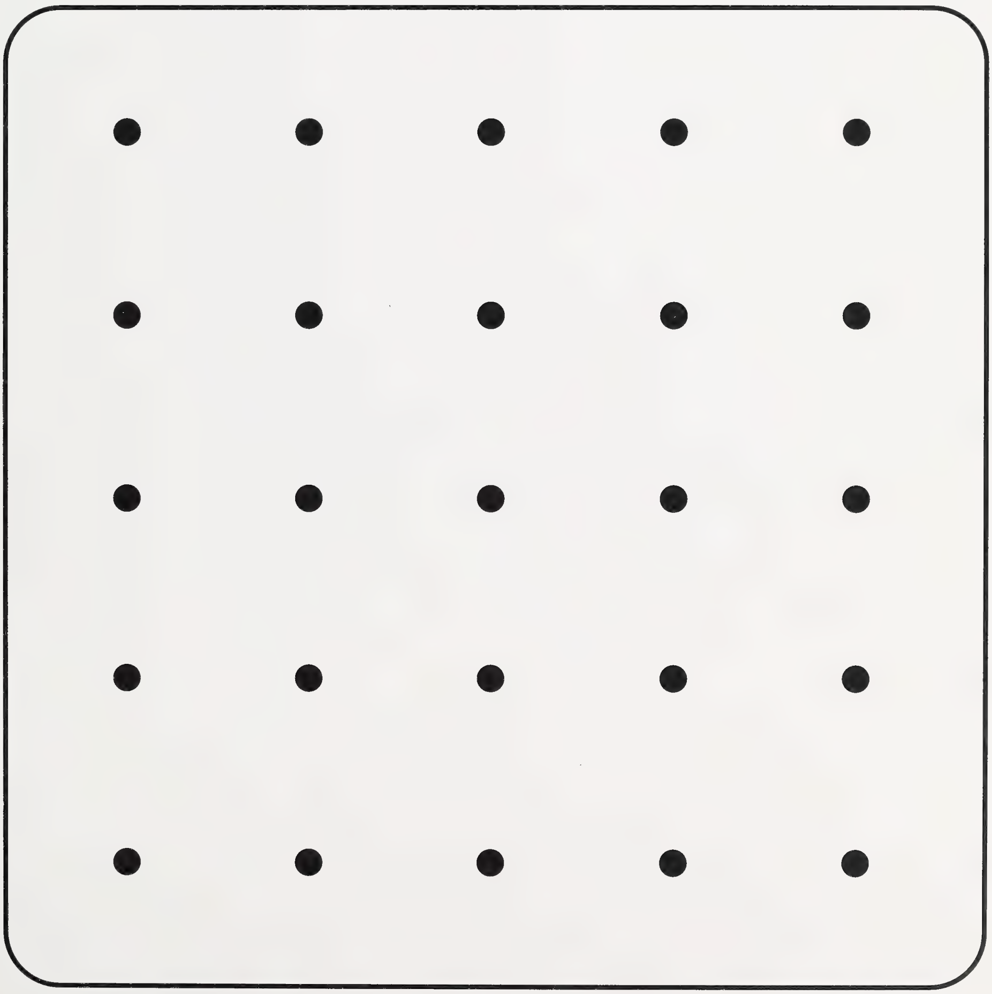
Day 3: Squares

Cut out these two squares.

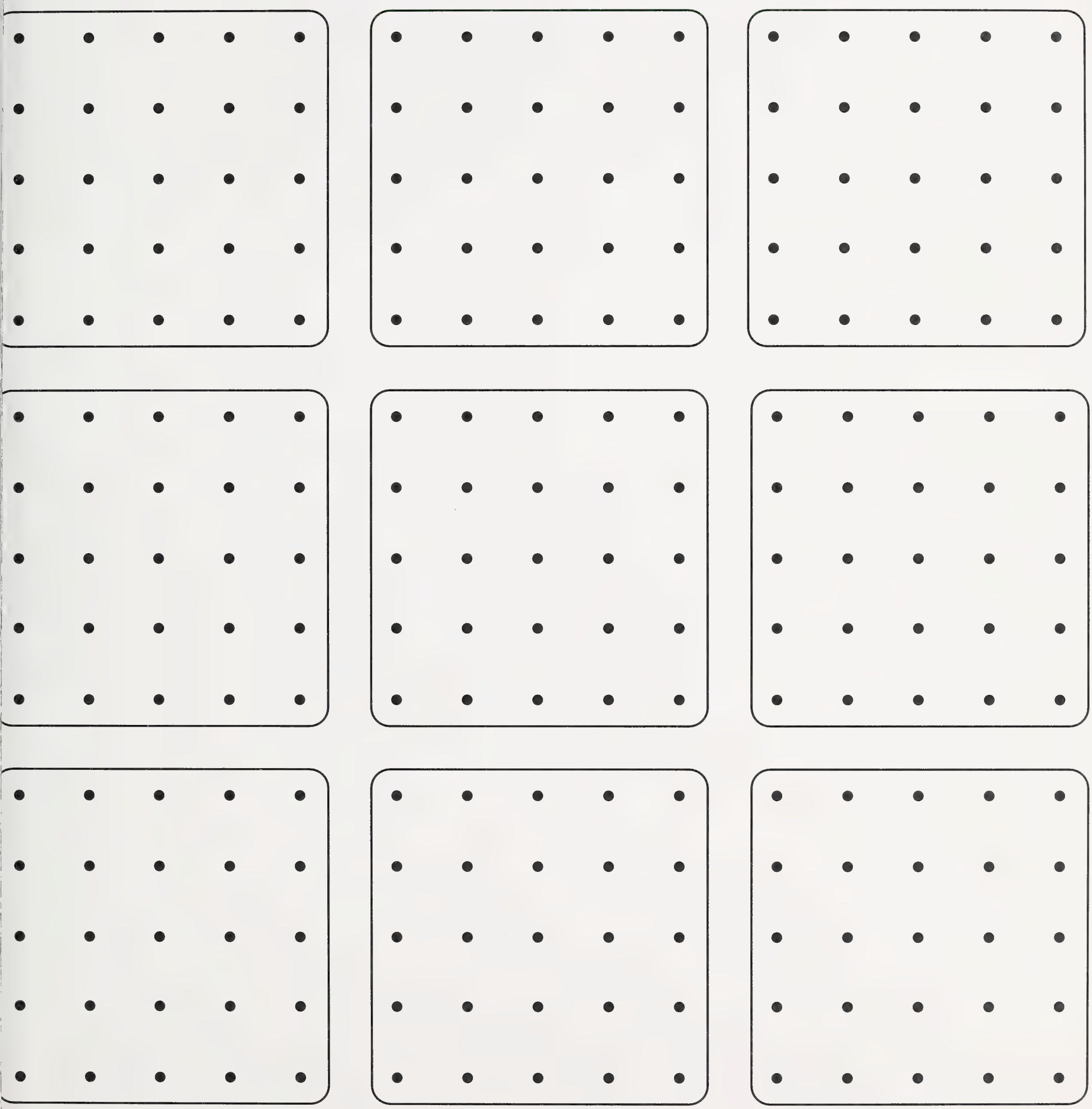
Day 3: Constructing Geoboard

If materials and time are available, the home instructor and student can co-operatively build a **geoboard**. It is a useful manipulative to extend the student's knowledge of geometry.

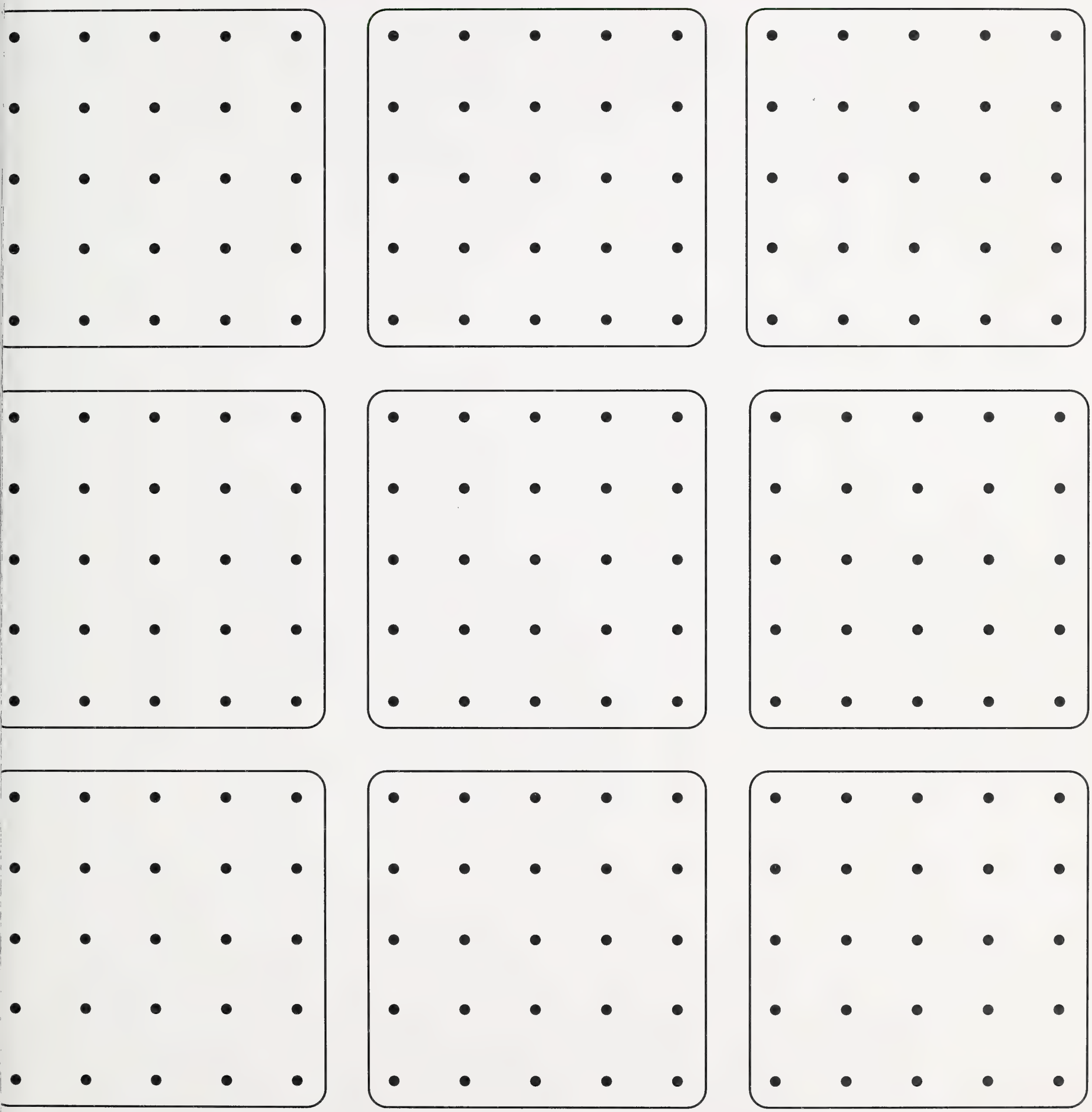
Cut a square of light plywood that measures 16 cm by 16 cm. Make a grid of nails using the dot pattern below. Be sure to keep the nails an equal distance apart.



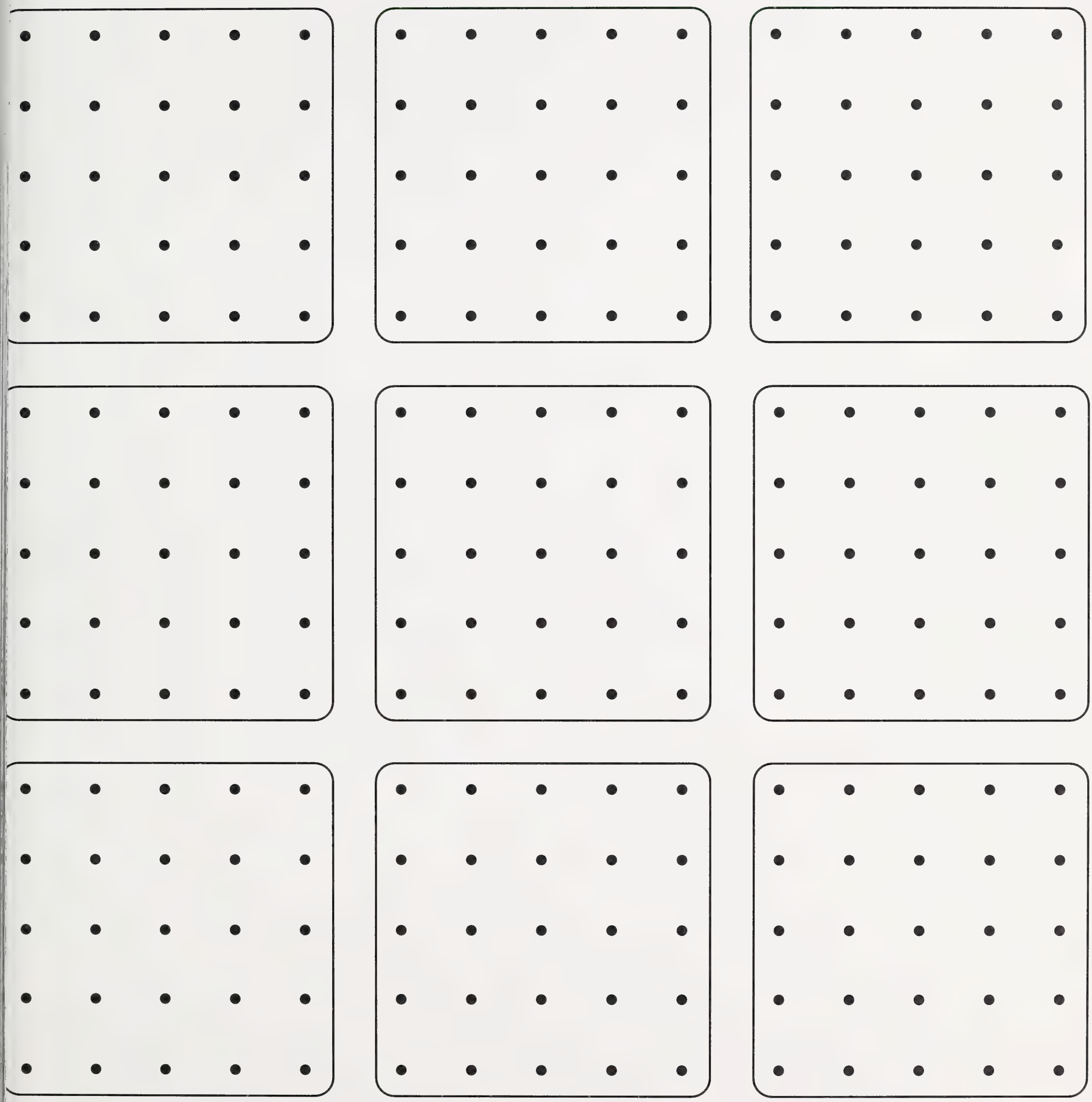
Day 3: Geoboard Patterns



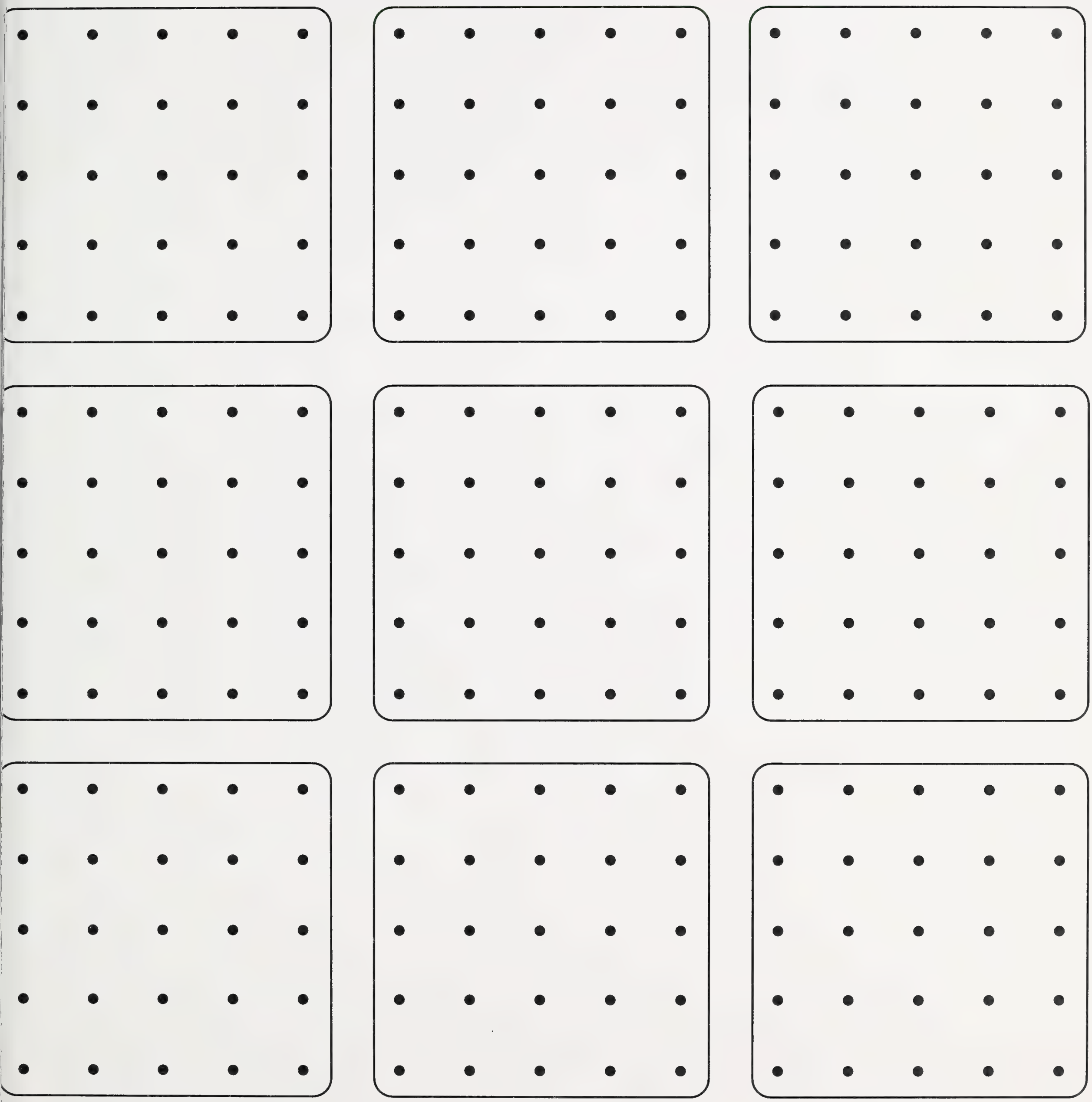
Day 3: Geoboard Patterns



Day 3: Geoboard Patterns

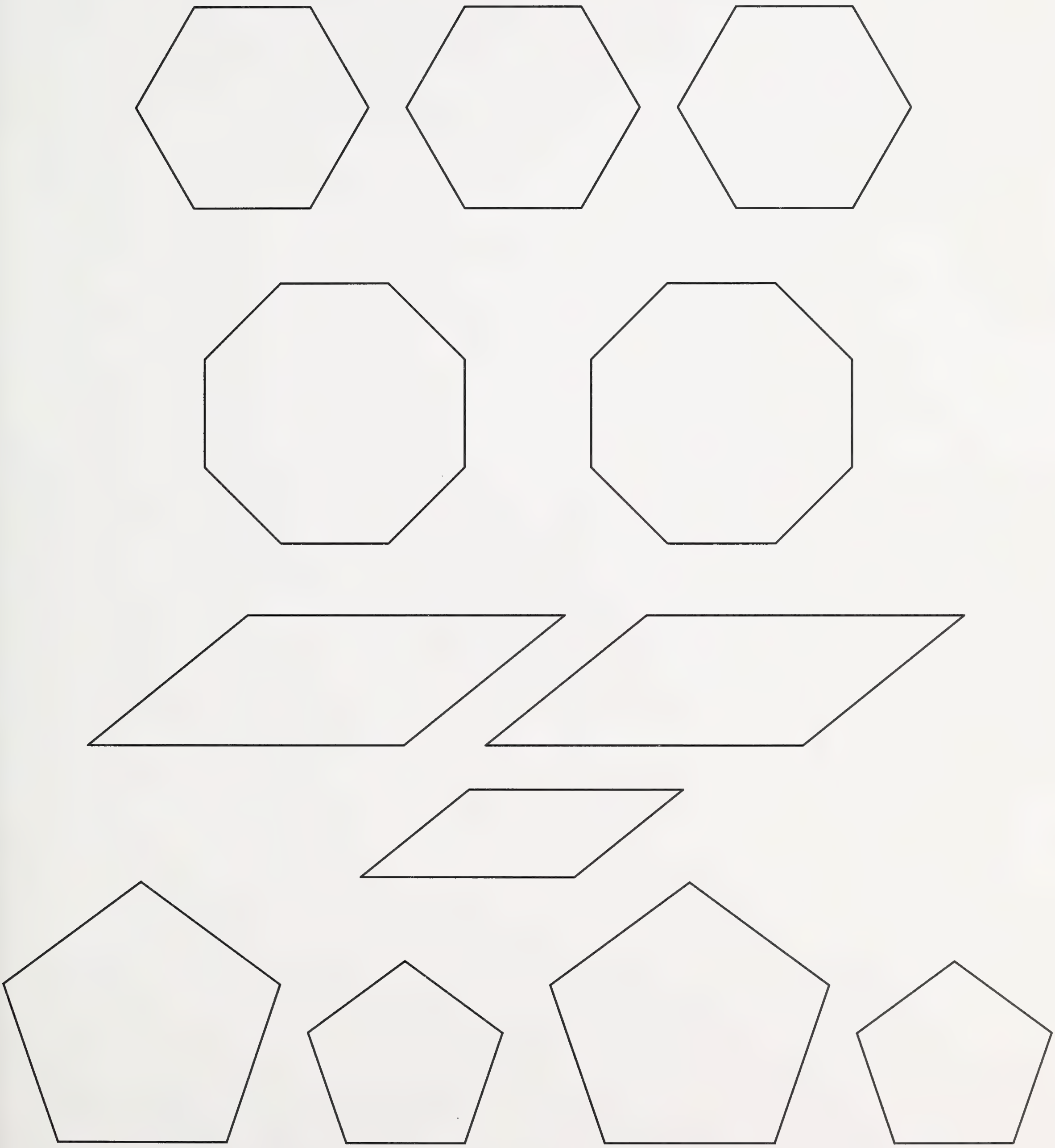


Day 3: Geoboard Patterns

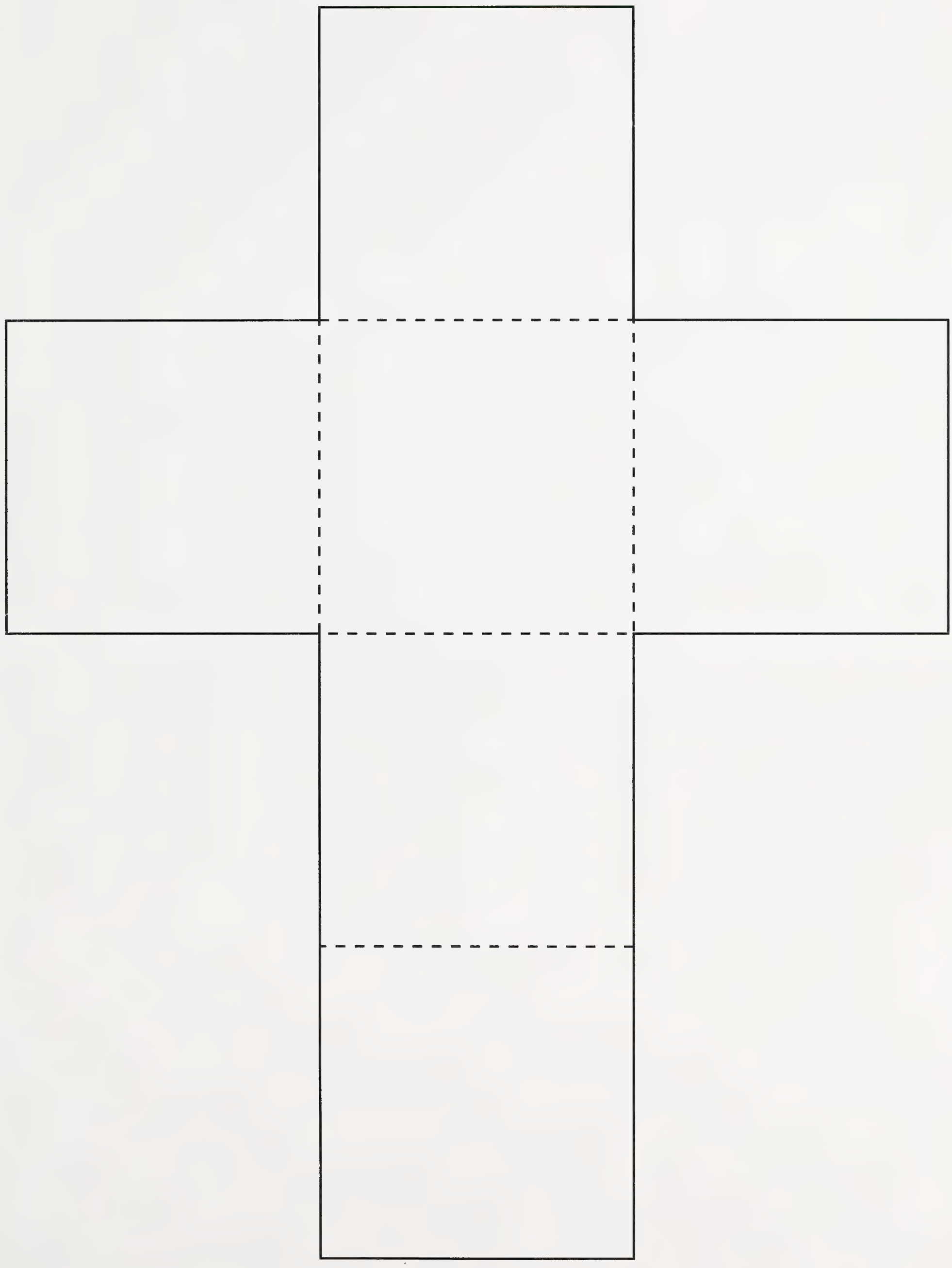


Day 3: Polygons

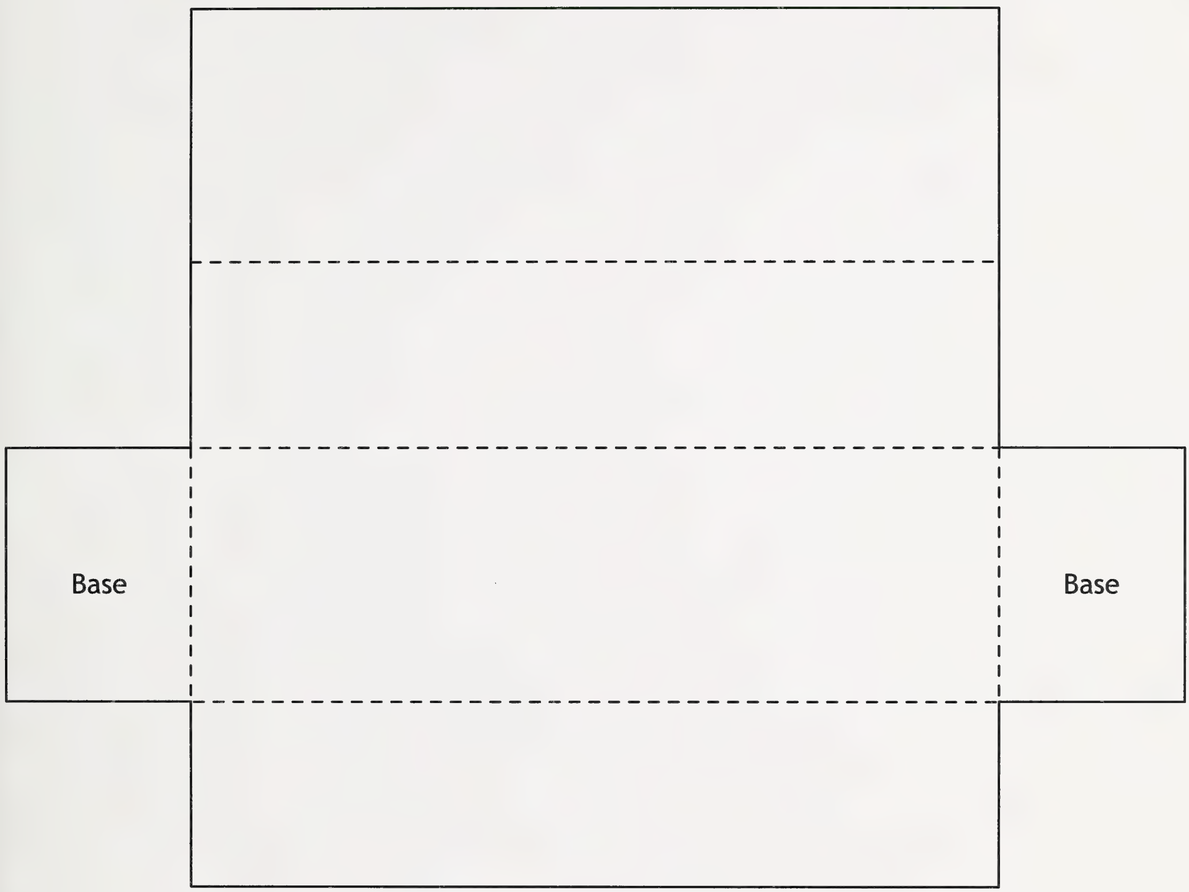
Colour and cut out these figures. Colour similar polygons the same colour.



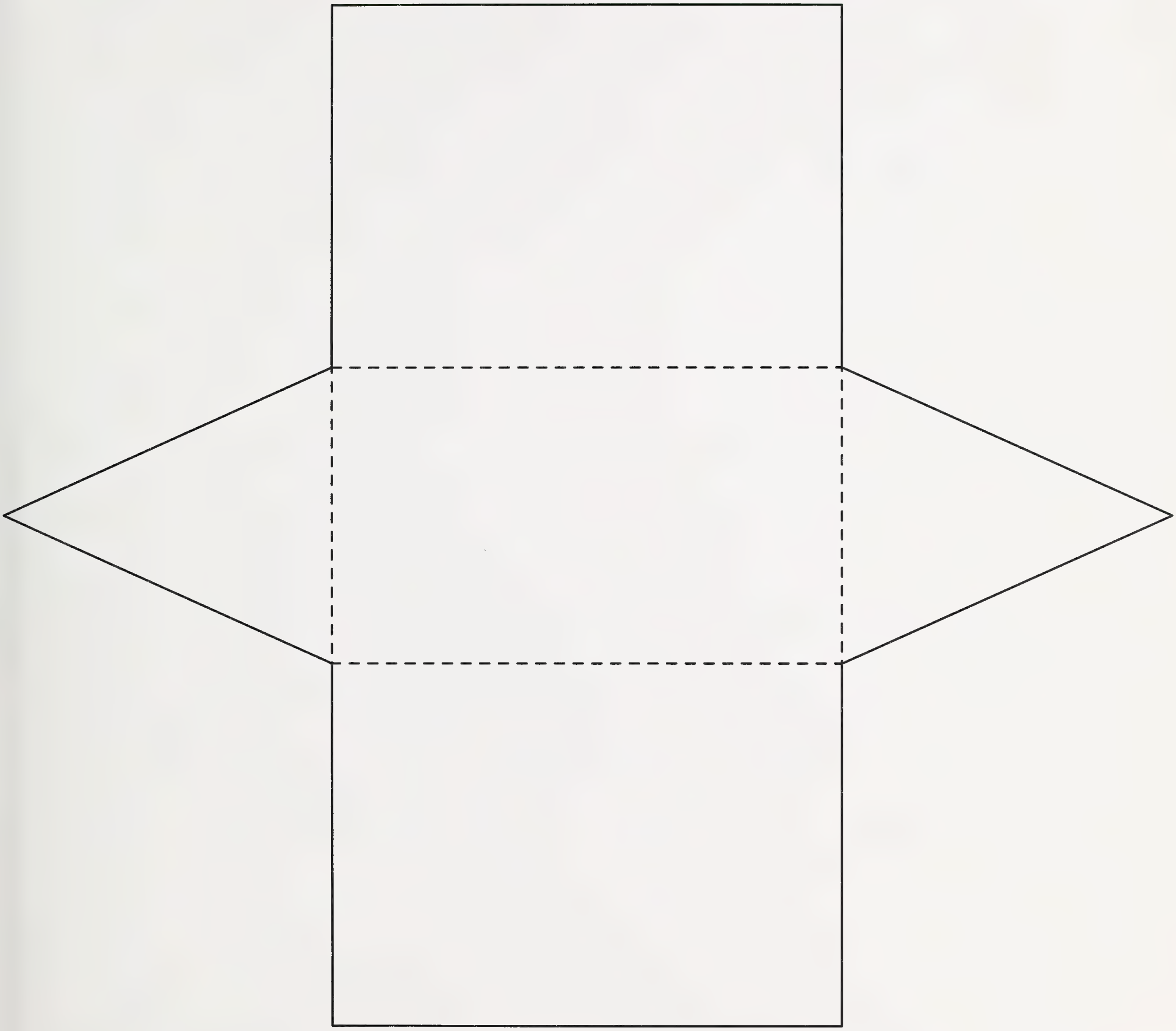
Day 9: Cube Net



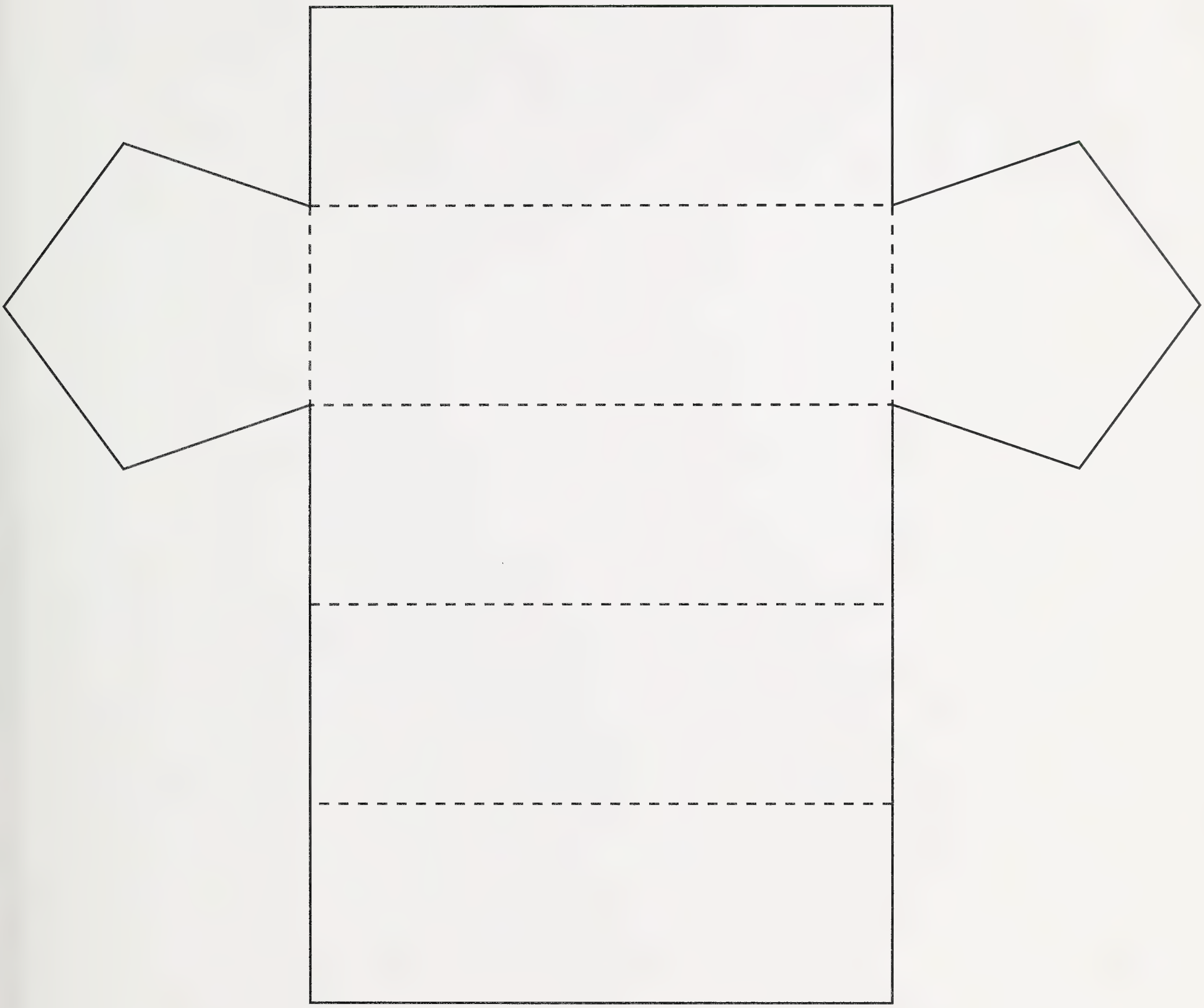
Day 9: Rectangular Prism Net



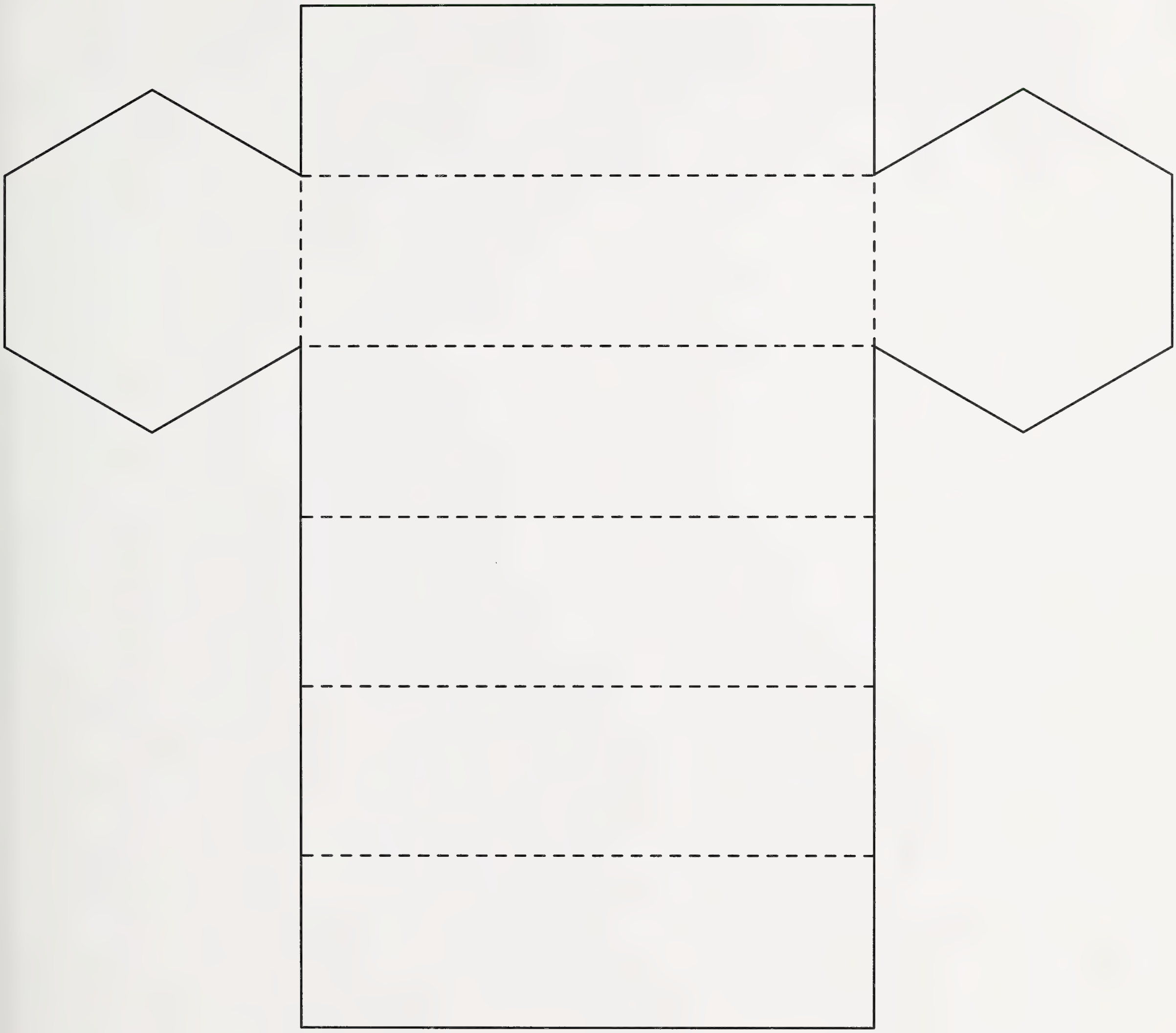
Day 10: Triangular Prism Net



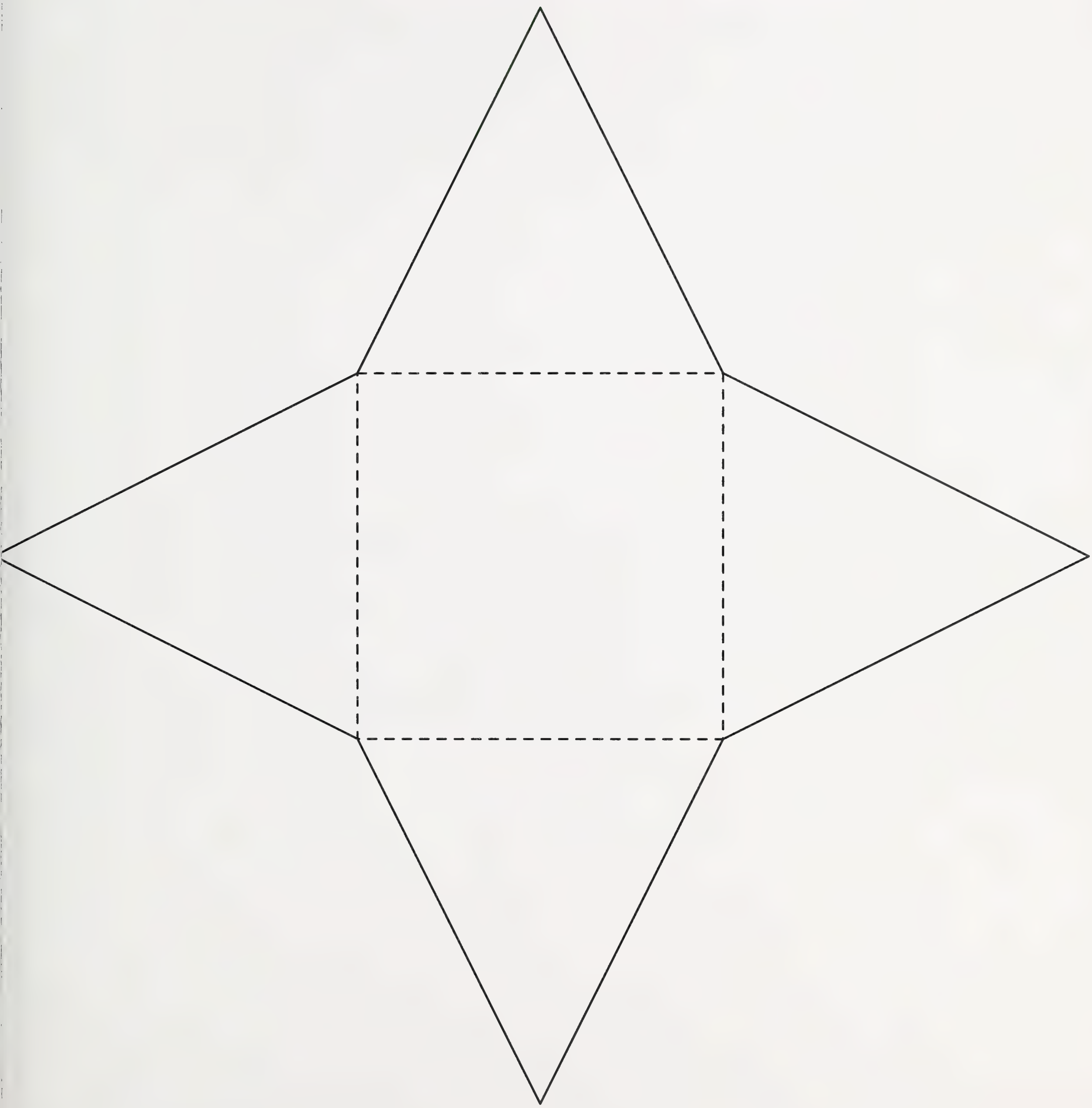
Day 10: Pentagonal Prism Net



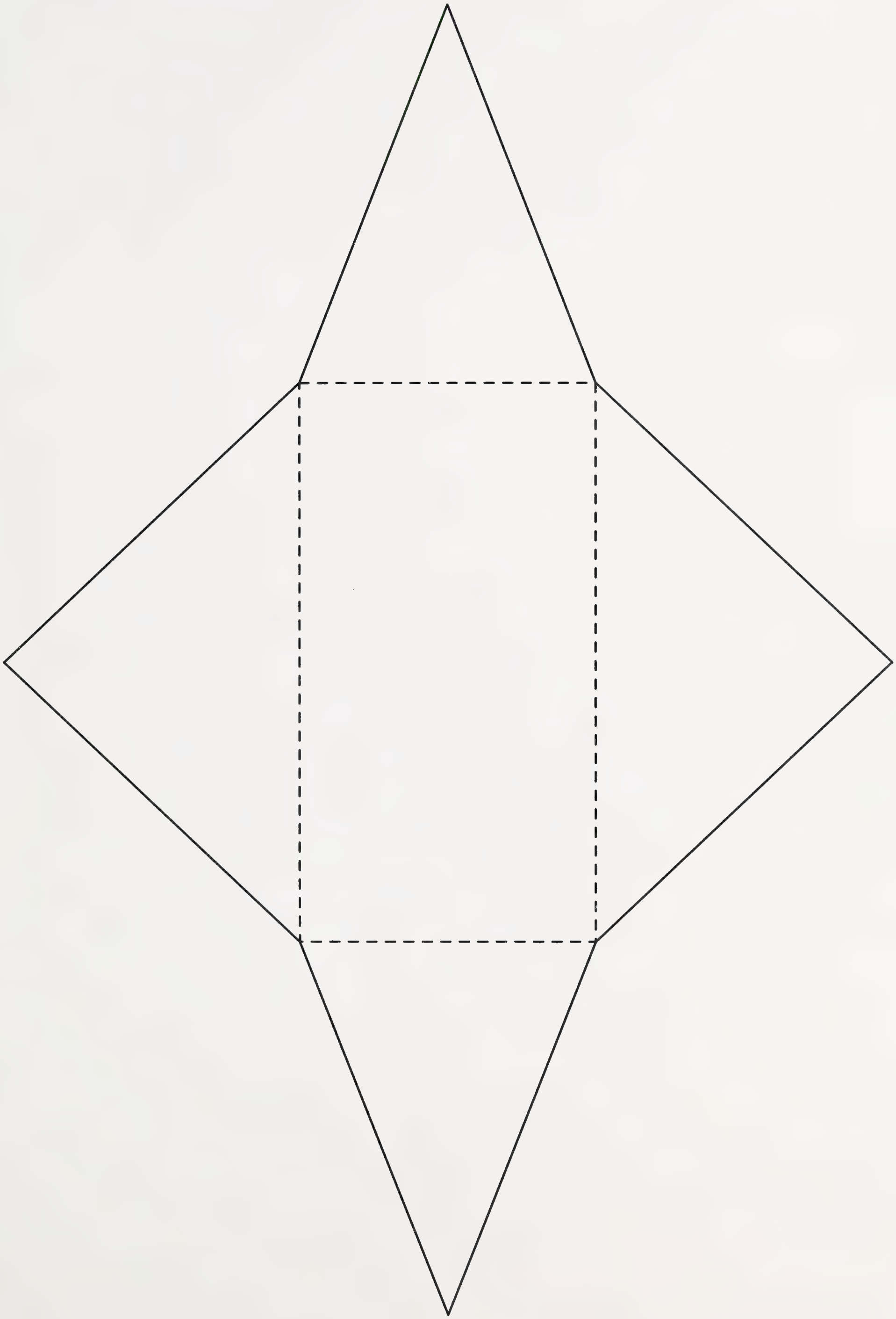
Day 10: Hexagonal Prism Net



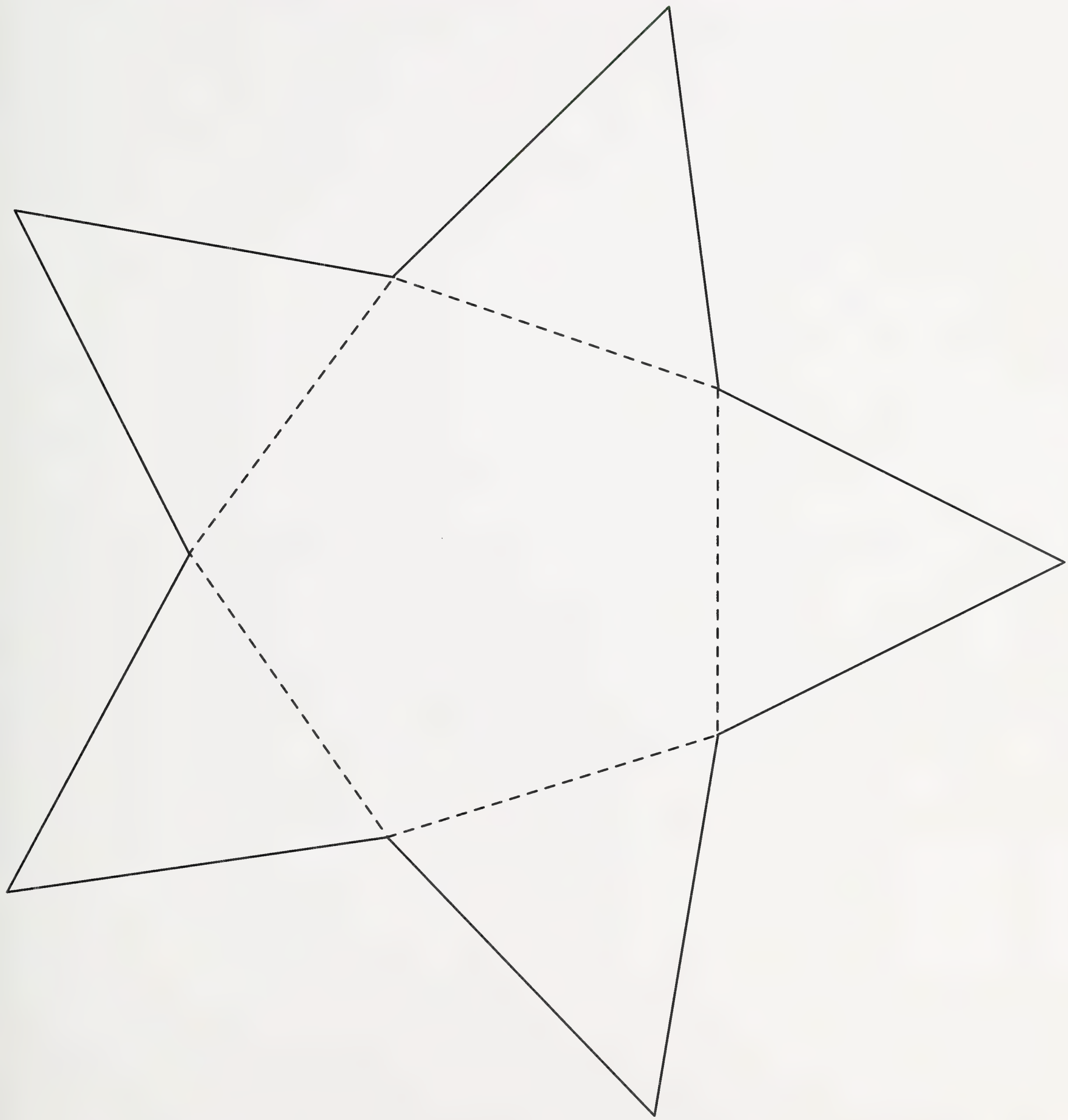
Day 12: Square-Based Pyramid Net



Day 12: Rectangular-Based Pyramid Net



Day 12: Pentagonal-Based Pyramid Net



Day 18: Grid

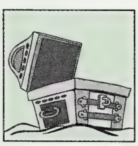
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

Day 20: Treasure Search Games 1 and 2

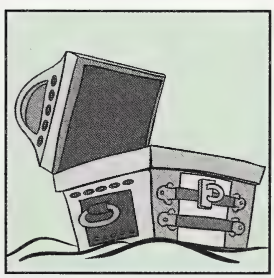
5							
4							
3							
2							
1							
	A	B	C	D	E	F	G

Cut out these treasure symbols.

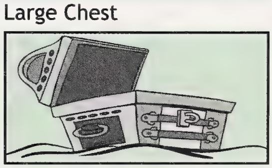
Search Game 1



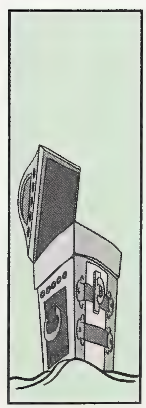
Search Game 2



Large Chest



Wide Chest



Tall Chest

Day 20: Treasure Search Games 1 and 2

5							
4							
3							
2							
1							
	A	B	C	D	E	F	G

Cut- -

5							
4							
3							
2							
1							
	A	B	C	D	E	F	G

Day 20: Treasure Search Games 1 and 2

5							
4							
3							
2							
1							
	A	B	C	D	E	F	G

Cut

5							
4							
3							
2							
1							
	A	B	C	D	E	F	G

Day 20: Treasure Search Games 1 and 2

5							
4							
3							
2							
1							
	A	B	C	D	E	F	G

Cut- -

5							
4							
3							
2							
1							
	A	B	C	D	E	F	G

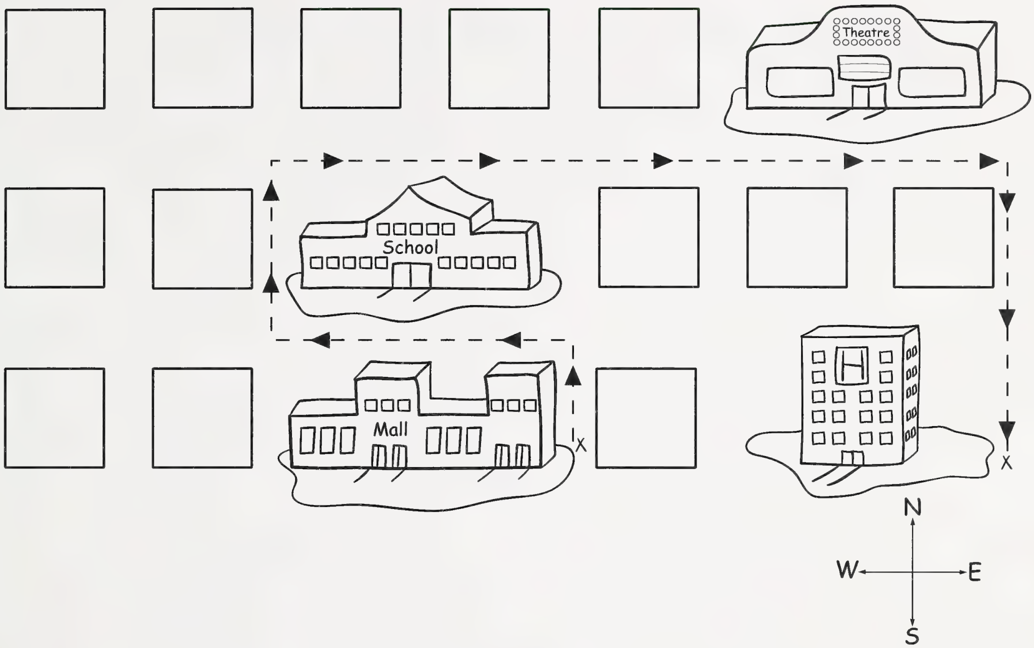
Day 20: Treasure Search Games 1 and 2

5							
4							
3							
2							
1							
	A	B	C	D	E	F	G

Cut

5							
4							
3							
2							
1							
	A	B	C	D	E	F	G

Day 20: Search Game 3

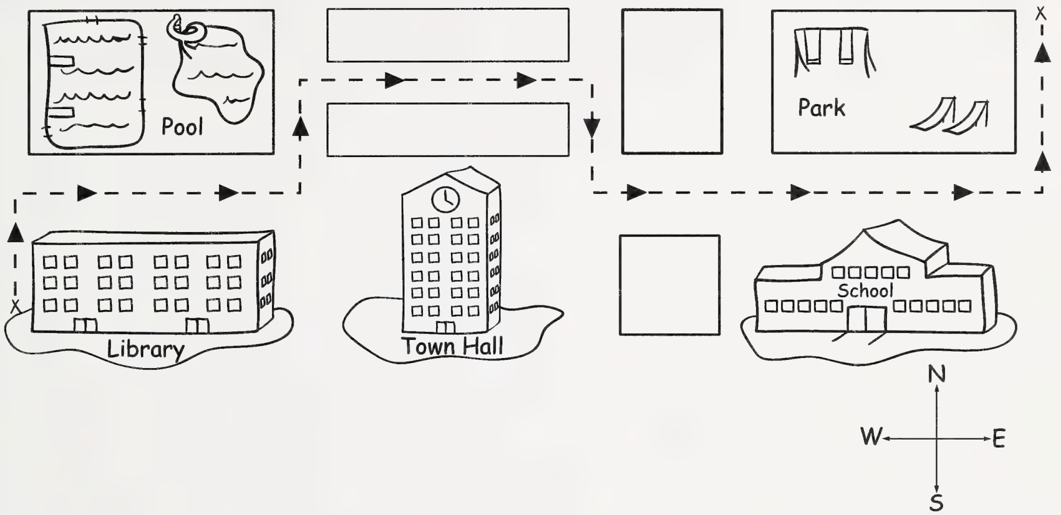


Directions:

- Start on the east side of the hospital.
- Go north until you reach the southeast corner of the theatre.
- Turn and go west along this street until you get to the northwest corner of the school.
- Turn and go east one long block.
- Turn and go south one block.
- What building is west of you? This is the hidden location.

Day 20: Search Game 4

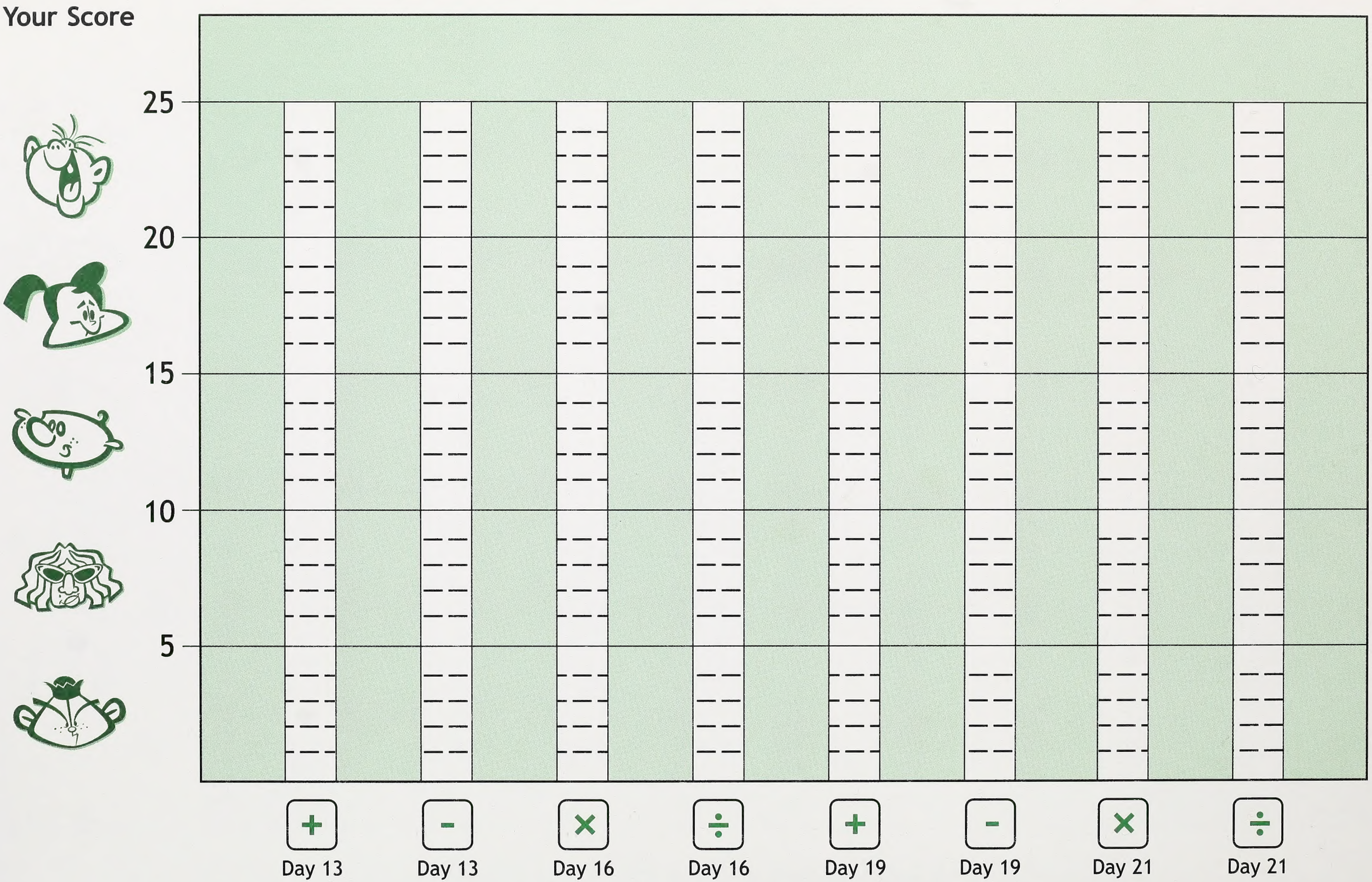
Describe the following path so the home instructor can draw it on the map in the Student Module Booklet.



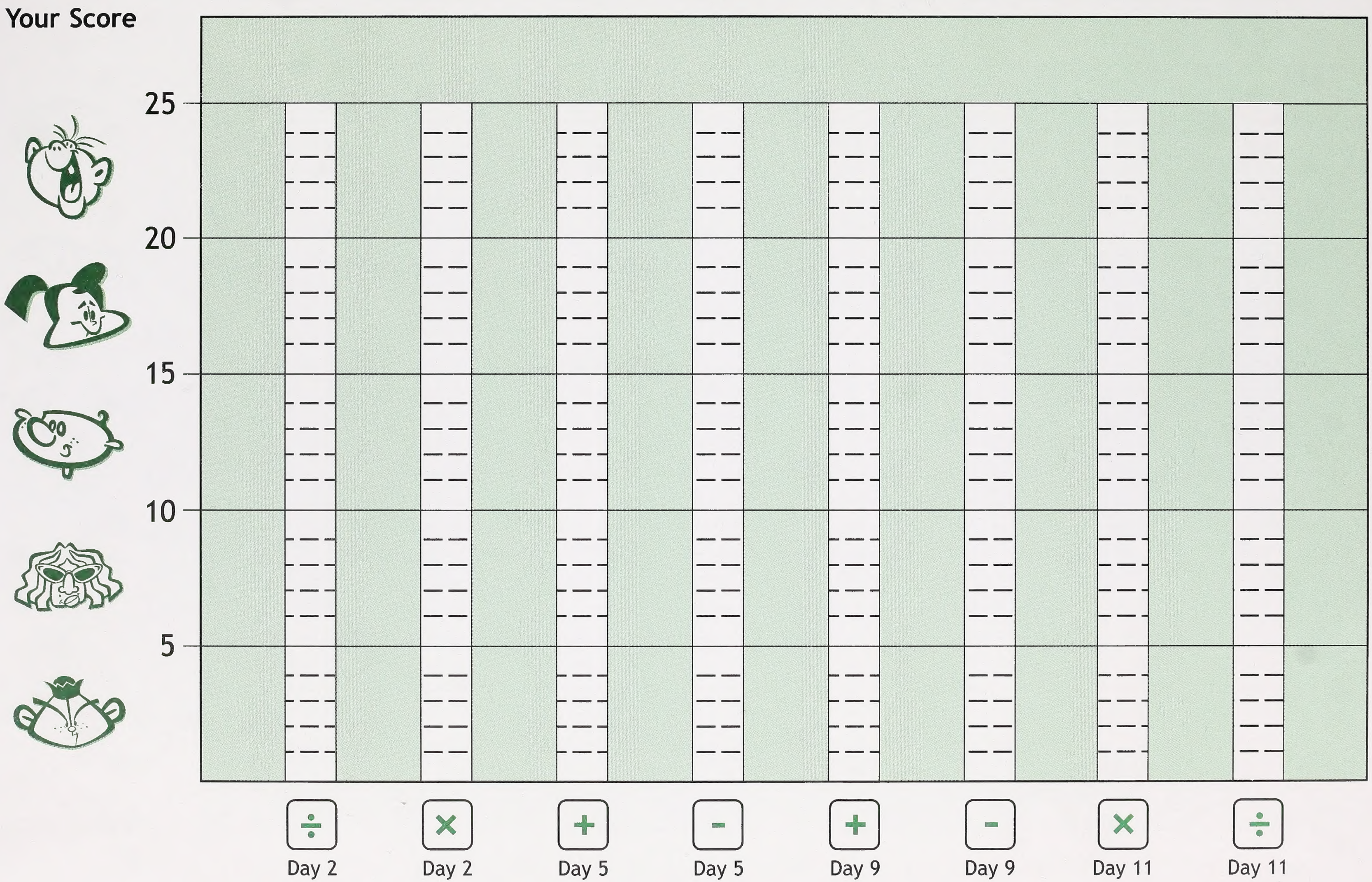
The hidden location is west of the finishing point. It is the ______________________.

Day 21: Grids for Symmetrical Designs

Number Facts Progress Chart for Module 8



Number Facts Progress Chart for Module 8



Mathematics 4
Student Module Booklet
Module 8

LRDC

2000